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THESIS

SURFACE SHIP SHORE INTERMEDIATE MAINTENANCE ACTIVITY COSTS UNDER DEFENSE BUSINESS OPERATIONS FUND REGULATIONS

by

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June 1996

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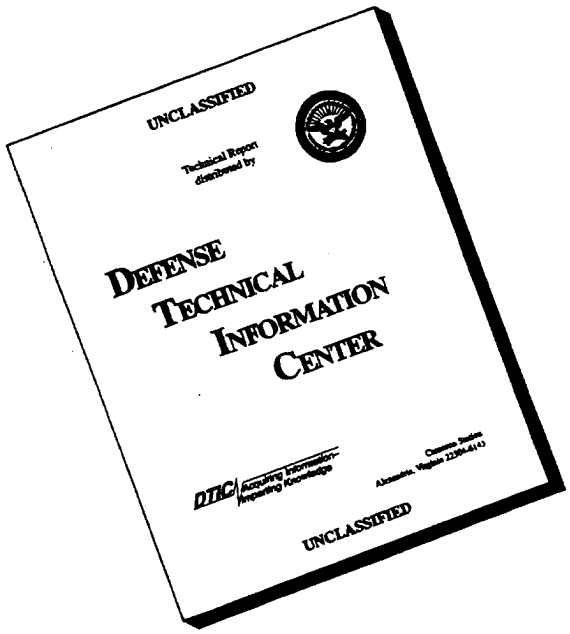

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The thesis develops a FY 95 manday rate for a Shore Intermediate Maintenance Activity (SIMA) using Department of Defense Financial Management Regulations (DoD FMR) for Defense Business Operations Fund (DBOF) Operations in support of Regional Maintenance goals. The manday rate calculated, $694.64, is compared with Naval Shipyard (NSY) composite manday rates for FY 95. The NSY manday rates ranged from a high of $661.80 to a low of $408.83 with an average of $513.35. The comparison is of the costs associated with levels of effort, without adjustments for differing productivities or efficiencies. Some deviations from DoD FMR and adjustments to NSY manday rates were required in order to make SIMA and NSY manday rates directly comparable. The thesis also shows that the majority of the costs associated with the operation of a SIMA are fixed; $76,324,797 of the $116,288,974 in total operating costs were fixed costs. Of the $39,964,177 identified as variable costs, $36,255,321 are unavoidable cost— the costs of materials and services to complete necessary repairs or maintenance which would be incurred by the Navy regardless of where the work was performed. The fixed cost nature of operating a SIMA contributes to the higher manday rate. Computations using hourly labor costs for production efforts resulted in a manday rate of $572.15 and identified $14,922,797 as the cost of maintaining a fixed production labor force. Using hourly labor costs for support efforts should provide additional reductions in the manday rate.

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SURFACE SHIP SHORE INTERMEDIATE MAINTENANCE ACTIVITY COSTS UNDER DEFENSE BUSINESS OPERATIONS FUND REGULATIONS

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ABSTRACT

The thesis develops a FY 95 manday rate for a Shore Intermediate Maintenance Activity (SIMA) using Department of Defense Financial Management Regulations (DoD FMR) for Defense Business Operations Fund (DBOF) Operations in support of Regional Maintenance goals. The manday rate calculated, $694.64, is compared with Naval Shipyard (NSY) composite manday rates for FY 95. The NSY manday rates ranged from a high of $661.80 to a low of $408.83 with an average of $513.35. The comparison is of the costs associated with levels of effort, without adjustments for differing productivities or efficiencies. Some deviations from DoD FMR and adjustments to NSY manday rates were required in order to make SIMA and NSY manday rates directly comparable. The thesis also shows that the majority of the costs associated with the operation of a SIMA are fixed; $76,324,797 of the $116,288,974 in total operating costs were fixed costs. Of the $39,964,177 identified as variable costs, $36,255,321 are unavoidable cost— the costs of materials and services to complete necessary repairs or maintenance which would be incurred by the Navy regardless of where the work was performed. The fixed cost nature of operating a SIMA contributes to the higher manday rate. Computations using hourly labor costs for production efforts resulted in a manday rate of $572.15 and identified $14,922,797 as the cost of maintaining a fixed production labor force. Using hourly labor costs for support efforts should provide additional reductions in the manday rate.

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A. BACKGROUND

The Department of the Navy is currently implementing a significant change in its maintenance organizations and procedures in the hope of achieving more efficient and effective support of fleet units. The underlying assumption leading to this change is that there are inefficiencies and redundancies in the existing maintenance infrastructure. This change, known as the Regional Maintenance Initiative, will reduce the maintenance infrastructure and retain only the most effective and efficient elements. These elements will be combined into a consolidated regional maintenance center (RMC). These RMCs will consist of military and civilian personnel capable of performing maintenance on surface ships, submarines, and aircraft. RMCs will consist of elements from depot level maintenance activities (Naval Shipyards (NSYs) and Naval Aviation Depots (NADEPS)) and Intermediate Maintenance Activities (IMAs) for ship, submarine and air communities.

The concept behind Regional Maintenance is to streamline the maintenance process and reduce the maintenance infrastructure and its associated costs to the Department of the Navy. The ultimate goals of Regional Maintenance are to:

1. Reduce infrastructure to an efficient level appropriate for the current force structure;

2. Provide the customer a single, accessible, accountable provider of maintenance; and

3. Produce savings from consolidations and co-locations of infrastructure and capabilities.

These are the major goals. There are many ancillary objectives not addressed here which do not conflict with the objectives of this study.

A concern for these proposed regional activities is the method of funding. Currently depot activities are operated through the Defense Business Operations Fund (DBOF) and IMAs are mission funded through direct appropriations. The consolidation of accounting procedures and funding sources into a single approach for all activity types could greatly simplify the RMCs' efforts in managing resources efficiently and effectively.

The process of implementing Regional Maintenance is to combine a collection of dissimilar activities into a single organization for each region. Duplicative and redundant maintenance facilities and capabilities will be systematically streamlined, allowing the RMC to retain only the most efficient, effective elements of each organization at the appropriate capacity level. These RMCs will be centrally located among all Naval assets in the region. A central premise to Regional Maintenance is that the transportation of equipment and/or maintenance workers is less expensive than the costs of the infrastructure necessary for maintaining the capability at all current locations. An RMC will consist of one industrial facility, composed of military and civilian personnel, which performs the maintenance activities common to all platforms. Each type of craft will have organizations capable of platform-specific maintenance, manned mostly by military personnel, located in the immediate area of those units. This will eliminate the costs of maintaining redundant capabilities in the same area and place all maintenance activities under a single command organization.

Associated with these efforts to establish RMCs is the need to identify the true costs of operating IMAs. Because IMAs are mission funded, there are the "hidden" costs of performing maintenance which need to be identified in order to provide decision makers with all relevant cost information. Additionally, in order to determine the most efficient and effective activities, it would be necessary to

implement a system, such as activity based cost accounting, which would allow direct comparison of the costs of performing similar maintenance actions at different activities.

B. OBJECTIVES

The objective of the thesis is to provide a composite manday rate for an IMA which is directly comparable to NSY DBOF composite manday rates. In the process of completing this, the true operating costs of an IMA will be determined, thus exposing the "hidden" costs of operating a mission funded activity. Additionally, an estimate of the cost of maintaining a fixed production labor force is calculated. This thesis should also provide a framework for computing the full cost recovery manday rates of other IMAs.

C. RESEARCH QUESTION

The primary research question is this: If Surface Ship Shore Intermediate Maintenance Activities were included in the Defense Business Operations Fund, what would the full cost recovery manday rates likely be? Subsidiary research questions include the following:

- What are the true costs of operating a Shore Intermediate Maintenance Activity?
- Do Shore Intermediate Maintenance Activities cost more or less than Naval Shipyards?
- Is Activity Based Costing a viable method for computing the costs of a Shore Intermediate Maintenance Activity?

D. SCOPE AND LIMITATIONS

This thesis will provide a fiscal year 1995 composite manday rate for Shore Intermediate Maintenance Activity San Diego which is directly comparable to Naval Shipyard manday rates, adjusted for differences in direct labor cost inclusions. This

manday rate will include all internal costs (SIMA San Diego's mission funding and military labor costs) as well as the obvious large external support costs (fire protection, security and personnel services).

There are several limitations to the scope and, therefore, the accuracy of the estimated manday rate calculated for SIMA San Diego. The most significant limitation is that this study represents one data point for one fiscal year. IMAs have different characteristics and therefore making a generalization from this study is limited in its application.

The sheer size of this project requires several limitations in order for it to be completed in a timely manner. These limitations derive from several assumptions that certain external support costs may be excluded because they would have an insignificant effect on the results of this study. Additional significant limitations on the estimate of the composite manday rate calculation are imposed due to the exclusion of labor costs for Temporary Additional Duty (TAD) personnel and Naval Reserve personnel. These personnel, while providing support and production efforts to SIMA San Diego, are assumed to be insignificant in their overall contribution. These issues and several others are addressed more fully in Chapter III.

E. METHODOLOGY

In order to make meaningful comparisons between these differing activities it is necessary to measure the manday costs using the same guidelines. Comparing activities which use different accounting procedures and financial constraints under a single set of guidelines requires the selection of a suitable framework. Because DBOF theoretically operates on a full cost recovery basis, its regulations and guidelines should capture all costs. Additionally, because NSYs are already members of DBOF, only SIMA manday rates need be calculated to be able to make a direct comparison. It was for these reasons DBOF regulations were chosen for this study.

The methodology used is primarily archival research of fiscal year 1995 SIMA San Diego records, interviews of personnel knowledgeable in the areas of DBOF and/or SIMA operations and a review of relevant regulations and instructions pertaining to DBOF and/or SIMA operations. All of the productivity data for SIMA San Diego was extracted from the Maintenance Resource Management System (MRMS) data base. Other sources of data include the personnel involved in the management of funds for the external costs which were identified in this study. All sources of financial data are found in the FY 95 records of the activities included in this study.

SIMA San Francisco was visited by the researcher to gain a general understanding of SIMA internal financial and production operations. This activity was not included as part of this thesis due to its impending closure (Spring 1996) and the time limitations placed on the study.

F. ORGANIZATION OF STUDY

The thesis is divided into four chapters and four appendices presented as follows:

Chapter I: **INTRODUCTION**

Chapter II: **BACKGROUND**

This chapter provides a summary of the differences between DBOF and mission funded maintenance activities. Emphasis is placed on the differences in the workforce (civilian versus military) and in the funding process (DBOF versus mission funding). Additional information is provided regarding the differing missions of the organizations and on the Regional Maintenance Initiative and its implementation.

Chapter III: **METHODOLOGY AND DATA**

Chapter III presents the data used in the thesis, the methodology used to collect and collate the data and all assumptions regarding the data collected and its

processing. A summary of the assumptions made for the purposes of this study and the potential impact on the calculated manday rate is provided.

Chapter IV: **ANALYSIS AND CONCLUSIONS**

The final calculation of SIMA San Diego's composite manday rate and its comparison with FY 95 NSY composite manday rates is presented in Chapter IV. Additionally, a discussion regarding the viability of the use of Activity Based Costing at an IMA and the significant reasons for the difference between NSY and SIMA San Diego manday rates are provided.

Appendix A: **SIMA SAN DIEGO MANNING AND LABOR COSTS**

This appendix provides the manning and labor costs for each organizational unit listed in the SIMA San Diego Activity Manning Document. The manning levels and associated labor costs are calculated using active duty billets authorized and standard composite military pay rates for military labor, with civilian labor costs calculated using the pay scales (and steps) used by SIMA San Diego for budgeting purposes and the labor acceleration rate used by Long Beach Naval Shipyard.

Appendix B: **MRMS DEFINITIONS**

Appendix B provides the definitions for the different categories of hours and productivity ratios addressed in this study. The formulas used for the productivity ratios are also provided.

Appendix C: **CALCULATION OF MANDAY RATES WITH DIRECT ALLOCATION OF SHOP SUPPORT LABOR COSTS**

Appendix C presents the calculation of manday rates with the labor support costs for each shop being included in the shops' labor costs rather than in the indirect overhead pool. This removes any bias in the individual shop manday rates caused by using the percentage of production personnel to determine the direct labor costs of

each shop. The composite manday rate remains unchanged because costs are being moved from the overhead pool to the direct labor category.

II. BACKGROUND

The Department of the Navy is currently implementing a significant change in its maintenance organizations and procedures in the hope of achieving more efficient and effective support of fleet units. The underlying assumption leading up to this change is that there are inefficiencies and redundancies in the existing maintenance infrastructure. This change, known as the Regional Maintenance Initiative, will reduce the maintenance infrastructure and retain only the most effective and efficient elements, which will be combined into a consolidated regional maintenance center (RMC). This RMC will consist of military and civilian personnel capable of performing maintenance on surface ships, submarines, and aircraft. The circumstances which created the need for this change and a conceptual framework for Regional Maintenance are provided in this chapter.

A. BACKGROUND

The current collection of Navy maintenance facilities consists of more than six different types of activities for aircraft, submarines and ships. Each type of activity is controlled by different commands, and, among them, are funded in at least two different ways. These activities are also categorized into two types, depot and intermediate level maintenance. In general, depot level facilities are controlled by the cognizant Systems Command and are funded through the Defense Business Operations Fund (DBOF). On the other hand, intermediate maintenance activities (IMAs) are mission funded through appropriated money and are controlled by the cognizant Type Commander. Table 1 provides examples of the activity types, maintenance level, funding, and the controlling authority. The major differences between the maintenance facilities are discussed below.

ACTIVITY	LEVEL	FUNDING	CONTROLLLING AUTHORITY
NAVAL SHIPYARD (NSY)	DEPOT	DBOF	NAVAL SEA SYSTEMS COMMAND
NAVAL AVIATION DEPOT (NADEP)	DEPOT	DBOF	NAVAL AIR SYSTEMS COMMAND
AVIATION INTERMEDIATE MAINTENANCE DEPARTMENT (AIMD)	INTERMEDIATE	APPROPRIATED	COMMANDER, NAVAL AIR FORCES ATLANTIC/PACIFIC FLEET
INTERMEDIATE MAINTENANCE FACILITY (IMF)	INTERMEDIATE	APPROPRIATED	COMMANDER, NAVAL SUBMARINE FORCES ATLANTIC/PACIFIC FLEET
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)	INTERMEDIATE	APPROPRIATED	COMMANDER, NAVAL SURFACE FORCES ATLANTIC/PACIFIC FLEET
TRIDENT REFIT FACILITY (TRF)	INTERMEDIATE	APPROPRIATED	COMMANDER, NAVAL SUBMARINE FORCES ATLANATIC/PACIFIC FLEET

Table 1. Examples of Maintenance Activities

1. Differing Missions

There is a significant difference in the scope of the different facility missions. Both depot and intermediate level activities are charged with completing repairs and maintenance for fleet units. However, IMAs are also charged with providing technically intensive training and experience to sailors during their tour of duty at the IMA. After a sailor has completed a shore duty at an IMA, he or she will return to a fleet unit a more skilled and experienced worker and will increase the self-sufficiency and readiness of the unit. This difference in missions affects both the workforce composition and the capabilities of the organizations.

2. Workforce Composition

There are several differences resulting from the dissimilarities in the manning between IMAs and NSYs. The composition of the work force directly affects the labor costs of the organization and, because of the differing skill levels, its capabilities. This section will address the differences in the workforce composition and their effects on the organization's capabilities and costs.

The most visible difference between depot and intermediate facilities is the composition of the workforce. Depot level activities are mostly federal civilian employees, with military personnel serving in administrative and supervisory roles. These civilian workers are generally long term employees who have performed the same jobs for several years. This large experience base allows the depot activities to perform the more complex and systemic maintenance and repairs. Intermediate maintenance activities are manned mostly by military personnel, with civilians performing some administrative and support functions. Sailors generally serve two to three years at an IMA before returning to duty in a ship or aircraft squadron. The constant, planned turnover of personnel at military activities prevents the retention of as broad an experience base as the depot levels are able to maintain. Intermediate activities are also much smaller organizations with manning levels far below depot activities.[1] Military personnel are also subject to general military training (GMT) requirements which are not required of civilian NSY personnel. These GMT requirements reduce the productive hours available per person at an IMA.[2] An additional difference caused by the civilian versus military manning is the ready manpower pool provided by an IMA. An IMA can be drawn on by an operational unit to temporarily replace critical personnel needed to fulfill its mission. For example, if a sailor responsible for gun maintenance and repairs on a ship scheduled to conduct a gunnery exercise is unable to perform his duties due to injury, a sailor

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[1]For example, SIMA San Francisco has approximately 300 personnel assigned and SIMA San Diego has approximately 2,400 personnel. Contrast this with Long Beach NSY with 4,200 civilians, Puget Sound NSY with 10,000, and Norfolk NSY with 7,000 civilian employees.

[2]SIMA San Diego recently identified as many as 60 hours of annual required training per production person.

from an IMA can temporarily replace him ensuring the ship will be able to complete its assigned mission. A civilian employee would not be able to replace a sailor.

The difference in the nature of the labor costs between the two organizations has the largest effect on the cost of labor. Because military personnel receive the same amount of pay each pay period regardless of the amount of work performed, they are, in affect, salaried employees. For SIMA San Diego this means the labor costs are fixed, with variations resulting only from changes in authorized billets. Short term changes in scheduled work load do not affect the IMA manning levels. Shipyard civilian employees at the production level are not salaried employees and are paid on an hourly basis. This hourly basis provides overtime, night and weekend pay incentives which increase the costs of shipyard labor. Additionally, a NSY can adjust the number of employees, within limits, to the amount necessary for the scheduled work load. Shipyard labor costs can easily vary.

The skill and proficiency levels of workers at a Naval shipyard are generally considered to be higher than those of a SIMA worker. This difference arises mainly from SIMA fulfilling its mission of providing meaningful shore duty for fleet sailors and improving their skill levels. A shipyard worker starts as an apprentice and works his/her way up through the skill levels over the entire time of employment. A sailor typically returns to the fleet from a SIMA after two to three years of duty at the apprentice or journeyman level. His/her ability to improve beyond the attained skill level would most likely require a second or third shore tour at SIMA. This disparity in skill levels is reduced or accounted for by the nature of work performed at these different organizations.[3] The shipyard generally completes more complex, depot level repairs while SIMAs perform more routine, intermediate maintenance actions.

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[3]Or, conversely, the Navy maintains the skill levels of SIMA sailors at the level necessary to perform the work assigned and maintains the professional ship-yard workers to perform the more complex repairs necessary.

The distinction between depot and intermediate level maintenance is based on the complexity of the work. Depot level work is more complex in nature and requires a larger, more skilled workforce to complete. Intermediate maintenance is more routine and less complex in nature and therefore requires a skill level somewhat lower than that required for depot level.[4] The lower manning levels along with the high turnover of personnel at an IMA often preclude the IMA from performing the complex, depot level work.

3. Funding Sources and Procedures

The different funding procedures for these activities probably create the largest barrier to implementing the Regional Maintenance Initiative. This funding difference has created the perception among the customers that the cost of work completed at an intermediate activity is substantially less expensive than similar work completed at a depot activity. This misperception is a result of the nature of the different systems. Depot level activities, which are members of the DBOF, charge their customers for work while intermediate activities, which are mission funded, do not.

a. Defense Business Operations Fund Activities

The Defense Business Operations Fund is a revolving fund which provides the necessary capital required for its members to perform their work. The Fund requires its members to charge customers[5] for services, with the goal of

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[4]For example, an intermediate facility might be asked to repair a piece of equipment with a known or suspected problem. Depot level facilities also repair equipment with known or suspected problems but also open and inspect fully operational equipment for problems and then repair as necessary (basically, inspect the equipment and perform an overhaul if there are indications of potential problems). Additionally, depot level maintenance is often performed at the system level while intermediate maintenance is usually performed at the equipment level.

[5]Customers are the fleet commanders (i.e., Commander-In-Chief Atlantic/Pacific Fleet).

a net operating result of zero (breaking even) for the fiscal year. A rate is calculated to recover all expected costs of operating based on the predicted workload. This manday rate is composed of all direct labor (civilian and military[6]), production overhead and general and administrative costs (i.e., administration and base support).[7] It does not include costs which would be directly attributable to a specific contract (i.e., repair parts or crane services). These costs are charged to the customer in addition to the manday rate. The revenues collected from the customers are returned to the DBOF in order to provide capital for future work. This requirement to charge customers is an incentive to the management of these activities to strive to reduce costs. It is forced to compete with other activities (civilian and military) based on its prices, so it must ensure its costs are as low as possible if it is to continue receiving work. It is also an incentive for the customers to be realistic in their requirements. Because the customer is being charged for services, it will be more discriminating in the services it requests— only the maintenance which actually needs to be accomplished will be done and the nice-to-haves will be reduced.

b. Appropriation Funded Activities

Activities which are mission funded through appropriated money (IMAs) do not charge customers for services[8] but do receive their operating budgets

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[6]DBOF activities pay the Military Personnel (Navy) Account for the labor services of military personnel assigned.

[7]Base support costs include fire department, police, personnel support, libraries, etc. If the DBOF activity is a tenant, its share of the costs of these items are paid to the host command on a reimbursable basis.

[8]SIMA San Diego occasionally performs services for local shore commands, for which it is reimbursed, and foreign navy ships. This reimbursement from local shore

from their customers. The reader may well believe there is not a difference between paying an activity a full cost recovery rate and providing an activity with the funds to operate. This is not the case because of the "hidden" costs associated with the operation of an IMA. The appropriated activity's budget pays only for direct costs (repair parts, crane services, etc,) and the overhead items (utilities, civilian labor, etc.) required to operate. Military salaries and base support (fire department, property maintenance, police protection, etc.) costs— the "hidden" costs— are not included in the activity's budget. Labor costs are paid from the Military Personnel (Navy) Account. Base support services are generally provided by the host base at no charge to the tenant command. In effect, the customer is only partially funding the cost of the maintenance, with the remaining costs being paid by other Navy organizations.

In summary, the different funding methods for maintenance activities creates a misperception as to their costs. Because the customer pays a full cost recovery rate to depot activities and only partially funds IMAs, maintenance performed by IMAs appears, to the customer, less expensive than similar maintenance at a depot activity. Ultimately, however, the Department of the Navy pays for all of the costs of maintenance, regardless of where it is performed. It is this different measurement of costs which creates difficulties for implementing Regional Maintenance. In order to retain only the most efficient and effective elements of the maintenance infrastructure, it is required to know the true operating costs of all activities under the same measurement.

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commands consists of material costs only with no operating or labor costs factored in. Foreign Military Sales (FMS) reimbursement rates are set and collected by the Defense Finance And Accounting Service (DFAS).

4. Infrastructure

The current drawdown in force structure has created an excess capacity in maintenance infrastructure. While much of the excess infrastructure is being addressed through the Base Realignment and Closure (BRAC) program (e.g., the closure of Long Beach Naval Shipyard), there are still areas where excess capacity and redundancies exist. Much of this is a result of the different communities which exist within the Navy: the surface, submarine, and air communities. The different community-specific mainten-ance needs have produced numerous redundancies at similar facilities.

Many of these facilities are located in the same geographic area and provide similar services for their customers. For example, in the San Diego, California area there is a Shore Intermediate Maintenance Activity (SIMA) at the 32nd Street Naval Station, an Air Intermediate Maintenance Department (AIMD) and a Naval Air Depot (NADEP) at the North Island Naval Air Station (NAS) and an AIMD at NAS Miramar. Each of these activities performs maintenance on numerous common items, such as gas turbine engines, electronic equipment, and structural components. All of these facilities are within 30 miles of each other and all bear the costs of maintaining the infrastructure to perform almost identical work. While there are differences in the specific equipments which are repaired and/or the procedures used, they are generally minor differences and could be overcome with little additional training or costs.

B. THE REGIONAL MAINTENANCE INITIATIVE

1. Concept and Goals

The concept behind Regional Maintenance is to streamline the maintenance process and reduce the maintenance infrastructure and its associated costs to the Department of the Navy. The underlying premise is that there are excess capacity and inefficiencies in the current system as a result of the force drawdown and the

redundancies created by the different communities each having their own proprietary facilities. The ultimate goals of Regional Maintenance are to

1. Reduce infrastructure to an efficient level appropriate for the current force structure;

2. Provide the customer a single, accessible, accountable provider of maintenance; and

3. Produce savings from consolidations and co-locations of infrastructure and capabilities.

These are the major goals. There are many ancillary objectives not addressed here which are not relevant to this study and do not conflict with its objectives.

2. The Regional Maintenance Implementation Process

The process of implementing Regional Maintenance is to combine this collection of dissimilar activities into a single organization for each of the eight designated regional areas.[9] Duplicative and redundant maintenance facilities and capabilities will be systematically streamlined, allowing the RMC to retain only the most efficient, effective elements of each organization (be it from a SIMA, AIMD, NADEP, or NSY) at the appropriate capacity level. These RMCs will be centrally located among all Naval assets in the region. Maintenance consolidation also includes Marine Corps maintenance requirements and facilities where commonalities exist. A central premise to Regional Maintenance is that the transportation of equipment and/or maintenance workers is less expensive than the costs of the infrastructure necessary for maintaining the capability at all current locations. An RMC will consist of these elements consolidated into one industrial facility, staffed by

[9]The eight regional areas are: Northeast, Mid Atlantic, Southeast, Ingleside, Hawaii, Southwest, Northwest, and WESTPAC (Japan).

military and civilian personnel, which performs the maintenance activities common to all platforms. Each type of craft will have organizations capable of platform-specific maintenance, manned mostly by military personnel, located near them. This will eliminate the costs of maintaining redundant capabilities in the same area and place all maintenance activities under a single command organization.

In theory, the NADEP at NAS North Island could be the only facility in the San Diego area which performs maintenance on, for example, gas turbine engines. This would involve the current civilian workers, military personnel from the AIMDs at North Island and Miramar and the military personnel from the SIMA at the Naval Station all being located at the NADEP. The costs of maintaining the infrastructure at three locations and administering these locations will be saved.

3. Reinvention Laboratory

Recently, the Secretary of the Navy designated the Regional Maintenance program as a National Performance Review Reinvention Laboratory. This was intended to facilitate the building of "a coordinated and user friendly maintenance system at low cost to the operating forces". (SECNAV Memo to CNO, 13 OCT 95) This designation allows the implementors of regional maintenance to be free from compliance with existing regulations (excluding statutory laws and Department of Defense Regulations) in their efforts to consolidate these diverse activities. That is, existing regulations will not be a deterrent for the development of new ideas or concepts relating to the implementation of Regional Maintenance.

4. Progress

The first activities to be consolidated into RMCs are the surface ship maintenance facilities. These facilities are, for the most part, Naval Shipyards (NSYs) and Shore Intermediate Maintenance Activities (SIMAs). There are currently two pilot programs being conducted: one in the Mid-Atlantic Region and one in the Northwest

Region. These pilots consist of consolidating single elements (such as a motor rewind or pump repair shop) of a SIMA with the NSY activity. Further consolidations will be made based on the results of these programs.

Associated with these efforts to establish RMCs is the need to identify the true costs of operating IMAs. Because IMAs are mission funded, there are the "hidden" costs of performing maintenance which need to be identified in order to provide decision makers with all relevant cost information. Additionally, in order to determine the most efficient and effective activities, it would be necessary to implement a system, such as activity based cost accounting, which would allow direct comparison of the costs of performing similar maintenance actions at different activities. Recently there have been several Naval Audit Service studies conducted to determine the costs of IMAs. The methodology of these studies differs from the regulations which are used to compute manday rates for NSYs.[10] Table 2 provides the results of some of these Naval Audit Service studies and the FY 95 NSY budgeted composite manday rates. The rates listed are the highest, median and lowest rates reported. As can be seen by these rates, the intermediate facilities costs appear significantly lower than the depot level costs.

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[10]The Naval Audit Service studies included only the operating budgets for the SIMAs and did not include base support items other than those already in the operating budget on a reimbursable basis (they did include the labor costs but did not include any of the other "hidden" costs). Additionally, the calculation of the number of direct production hours (the denominator in computing the manday rate) differs from the methods used to determine NSY manday rates.

Activity	Manday Rate
Puget Sound NSY	$515.28
Portsmouth NSY	$564.80
Pearl Harbor NSY	$774.76
SIMA Little Creek	$244.00
SIMA Norfolk	$284.00
SIMA Portsmouth	$306.00

Table 2. Selected NSY and SIMA Manday Rates

In order to make meaningful comparisons between these differing activities it is necessary to measure the manday costs using the same guidelines. Comparing activities which use different accounting procedures and financial constraints under a single set of guidelines requires the selection of a suitable framework. Because DBOF theoretically operates on a full cost recovery basis, its regulations and guidelines should capture all costs. Additionally, because NSYs are already members of DBOF, only SIMA manday rates need be calculated. This does not answer the deeper question of the efficiencies of the individual elements which comprise NSYs and SIMAs, only the identification of total costs and a directly comparable manday rate. As discussed above, similar internal cost control and measurement procedures need to exist at all activities, as well as the identification of all relevant costs, in order to make direct comparisons between elements of these activities.

III. METHODOLOGY AND DATA

This Chapter provides the methodologies used to collect and process data into the necessary components required for this study. The final calculations of SIMA San Diego's manday rate and analysis will be provided in the next chapter.

In an ideal world all information would be readily available in a format compatible with the requirements of the researcher. Additionally, there would be similar circumstances and environments (including motivating factors and requirements for data recording/reporting) in organizations between which a researcher is trying to make a comparison. Unfortunately, we do not work in an ideal world and organizations and their environments are often very dissimilar, leading to the requirement for assumptions and caveats on the data collected and its use. Also, because data is not always available or readily converted to similar formats, there are circumstances in which deviations from the original stated goals and requirements of the study need to be made. Below are discussed the assumptions, caveats and deviations from Department of Defense (DoD) Financial Management Regulations (FMR) which were necessary in order to produce a SIMA manday rate which accurately reflects costs and is most comparable to a DBOF activity's manday rate.

As in all circumstances, the data collected and analyzed are, at best, only as accurate as the records from which the data were extracted. This study assumes the personnel responsible for recording and reporting the information collected have been conscientious and fair in their duties and any automated systems used are accurate. There must be confidence in items such as equipment records (for calculating depreciation expense) and expended production hours (for determining the amounts of time spent on specific jobs) for there to be confidence in the results of analysis and calculations.

A. THE WORKFORCE AND LABOR COSTS

1. Civilian Versus Military Labor

There are several differences between civilian and military labor but, first and foremost, are their costs and skill levels. Military labor costs tend to be fixed while NSY labor costs vary. Additionally, NSYs have a more stable workforce and are able to maintain skilled workers while SIMA personnel rotate to other assignments after only two or three years. Chapter II addresses these issues in more detail. No adjustments are made in this study for the different nature of labor costs or for the different skill and proficiency levels of the workforce.

2. Reservists

There are many issues related to the treatment of reserve personnel costs and contributions to the active duty organization with which they are associated. These issues include the inability to accurately measure reservist productivity (contribution), the cost of reserve labor, and direct and indirect allocation of costs (i.e., what portion of the reservists costs should be attributed to direct labor hours and what portion attributed to training overhead). There is no argument that reservists do contribute to SIMA productivity. SIMA, San Diego received 19,033 mandays from reservists during FY 95. That is approximately 3.7 percent of the total mandays available from active duty SIMA personnel. Additionally, the gross production hours available for reservists, as documented in the MRMS data base, are approximately 1.9 percent of the active duty gross production hours.

For DBOF activities, the costs associated with maintaining war reserve/ mobilization/surge requirements are direct mission funded through appropriations and not charged in the customer rates. For this report it is assumed the costs of reservists performing duties at SIMA San Diego are a part of the war reserve/mobilization/surge requirement for SIMA and, thus, the labor costs associated with them are not billable to customers. It is also assumed the reserve contributions to SIMA are insignificant.

Any significant contribution by reservists would cause the calculated manday rate for SIMA to be understated.

If reserve labor costs were included, SIMA San Diego's manday rate would increase by approximately $23.91 because total labor costs for reserves are estimated to be $2,965,679.35. This is based on the reserve manday rates used by the Mutual Support Coordinator at Commander Naval Surface Forces Pacific (CNSP) of $299.32 per reserve officer manday and $153.41 per reserve enlisted manday. Because detailed information regarding reserve mandays was not available, the percentage of active duty officers at SIMA (1.65 percent) was used to determine the number of reserve officer mandays included in the total reserve mandays (19,033). Additionally, 16,546 reserve production hours, estimated from MRMS data, were added to the number of earned production hours of SIMA for the calculation of the $23.91 manday rate increase. These hours were included because they represent the productive efforts of the reservists.

3. The Cost of Labor

DBOF activities use a civilian equivalency pay schedule from the Department of Defense Comptroller's Office to repay the Military Personnel Account for services performed by military personnel. This equivalency pay is used to equalize civilian and military personnel costs at DBOF activities, thus reducing the incentive for altering the mix of civilian and military billets based on the costs of labor to the organization. (If, for example, O-4s were less expensive than GS-12s, then, in the long run, the activity would attempt to phase out GS-12 billets and increase O-4 billets.) In order to accurately reflect the costs to the Navy of operating a SIMA, the Composite Standard Military Rates[11] provided by the Defense Finance and

[11]The Composite Standard Military Rates are fully burdened military pay rates and established by estimating the amount of fringe benefits received by the average member of each paygrade. It is the equivalent amount a member needs to earn as a civilian in order to be economically indifferent to either civilian employment or military service.

Accounting Service (DFAS) Cleveland Center for FY 95 have been used to determine labor costs, rather than civilian equivalency rates. These rates are provided in Table 3. The researcher's sponsor agrees, in this case, the actual costs to the Navy are more important than the use of DBOF Regulations (this does not affect the comparison between the activities' manday rates, as the spirit of the research is being followed even though the letter of the DBOF regulations are not— that is, the goal is being achieved by not strictly adhering to the stated requirements).

The calculation of civilian labor costs were completed using the FY 95 civilian pay scales used by SIMA San Diego and the acceleration factor for fringe benefits used by Long Beach Naval Shipyard (LBNSY). For determining the annual labor costs, the fifth step for General Schedule (GS) grades and the third step for Federal Wage System (FWS) grades were used and 2,087 hours for the work year were assumed. These are the steps and hours used by SIMA San Diego in budgeting for civilian labor costs for FY 95. The acceleration factor was calculated using the LBNSY base rate of 40 percent[12] and, adjusting for paid leave, resulting in a rate of 20.5 percent. The paid leave categories were removed from the base acceleration factor because LBNSY applies the factor to labor hours and the acceleration factor in this study is applied to annual pay, which includes paid leave. Table 4 provides the calculations used for computing the acceleration rate. Table 5 contains the civilian labor costs used in this study.

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[12]Labor acceleration rates for DBOF activities vary in range from 40 to 42 percent. LBNSY rates were used because the original intent of this study was to compare SIMA San Diego with only LBNSY. The amount of NSY data available allowed the researcher to use all active NSYs in the final comparison vice only LBNSY.

RANK/RATE	HOURLY LABOR COST	ANNUAL LABOR COST
O-6	58.13	$ 120,909
O-5	49.22	$ 102,382
O-4	41.61	$ 86,556
O-3	35.75	$ 74,368
O-2	27.56	$ 57,323
O-1	21.52	$ 44,763
W-4	39.83	$ 82,582
W-3	33.09	$ 68,835
W-2	28.80	$ 59,912
E-9	32.65	$ 67,916
E-8	27.72	$ 57,648
E-7	23.91	$ 49,726
E-6	20.49	$ 42,624
E-5	16.96	$ 35,278
E-4	14.09	$ 29,298
E-3	11.91	$ 24,781

Table 3. FY 95 Standard Composite Military Rates

CATEGORY	RATE (%)
HEALTH BENEFITS	6.852
FICA	2.800
LIFE INS	0.148
RETIREMENT	4.900
ANNUAL LEAVE	9.000
SICK LEAVE	6.000
HOLIDAY LEAVE	4.500
THRIFT SAVINGS	0.400
FERS	3.500
MEDICARE	1.400
MISC	0.500
LBNSY TOTAL	40.00
ANNUAL LEAVE	(9.00)
SICK LEAVE	(6.00)
HOLIDAY LEAVE	(4.50)
ACCELERATION RATE USED	20.50

Table 4. Civilian Wage Acceleration Factor

GRADE	HOURLY RATE	ANNUAL PAY	ACCELERATION FACTOR	ACCELERATED LABOR COST
GS-13		$ 58,795	0.2050	$ 70,848
GS-12		$ 49,444	0.2050	$ 59,580
GS-11		$ 41,253	0.2050	$ 49,710
GS-9		$ 34,007	0.2050	$ 40,978
GS-7		$ 27,871	0.2050	$ 33,585
GS-6		$ 25,083	0.2050	$ 30,225
GS-5		$ 22,505	0.2050	$ 27,119
GS-4		$ 20,112	0.2050	$ 24,235
GS-3		$ 17,920	0.2050	$ 21,594
WD-6	$ 18.24	$ 38,067	0.2050	$ 45,871
WG-11	$ 15.33	$ 31,994	0.2050	$ 38,552
WG-10	$ 14.81	$ 30,908	0.2050	$ 37,245
WG-9	$ 14.29	$ 29,823	0.2050	$ 35,937
WG-7	$ 13.25	$ 27,653	0.2050	$ 33,322
WL-12	$ 17.46	$ 36,439	0.2050	$ 43,909
WL-10	$ 16.30	$ 34,018	0.2050	$ 40,992
WL-9	$ 15.73	$ 32,829	0.2050	$ 39,558
WN-7	$ 21.59	$ 45,058	0.2050	$ 54,295

Table 5. Accelerated Civilian Annual Labor Costs

4. Manning Levels and Total Labor Costs

Department of Defense FMR (DoD INST 7000.14-R, Volume 11B, Chapter 62, p. 62-1) require activities to compensate the Military Personnel (Navy) Account on the basis of billets authorized vice actual manning levels. This study complies with DBOF requirements and uses authorized billets in the calculation of labor costs. However, it should be noted that SIMA San Diego regularly has sailors assigned in addition to the regular manning levels (an average of 217 personnel each month of FY

95— approximately 20 percent of the direct labor billets and 11 percent of total billets authorized). The majority of these personnel are sailors who, for one reason[13] or another, cannot perform their duties in the units to which they were assigned. While these personnel contribute to the production efforts of SIMA, they are not included in the cost calculations. The contribution to SIMA's production efforts by these sailors is generally not as direct production workers, but in administrative/support duties (i.e., documenting reports, quarterdeck watches, etc.) which would otherwise be performed by production personnel. Their presence allows SIMA production personnel to concentrate more of their efforts towards production in place of support. It is unlikely a sailor who is either limited in his/her physical capabilities or preoccupied with family/legal issues is as productive as the trained, experienced SIMA sailor. It should also be noted that the assignment of these personnel to SIMA is beyond the control of the organization and, as is the nature of illness, injury and personal problems, is of a random nature. That is, SIMA is as likely to be assigned a person in a rating whose corresponding shop is underloaded as it is to be assigned a sailor with the skills required to assist a fully loaded shop. Current practice is to assign these sailors to units where some productivity can be realized instead of assigning them to a Transient Personnel Unit, where no productivity can be realized. For the purposes of this report, it is assumed the productive contributions of these temporarily assigned sailors is insignificant. This is consistent with not including their costs in labor cost calculations. The impact of a significant contribution by the

[13]The typical reasons for being temporarily assigned to SIMA have to do with the members inability to go or requirement not to go to sea with their assigned units. Examples include the following: family related issues, limited duty for medical reasons, pregnancy or legal hold status.

temporarily assigned sailors is an understatement of SIMA's manday rate by an estimate of $69.[14]

During FY 95 SIMA San Diego operated a detachment in the Long Beach Naval Shipyard which consisted of approximately 65 personnel. Approximately 40 of the personnel are permanently assigned to the Long Beach Detachment (LB Det) as they await transfer after the recent closing of the Long Beach SIMA. SIMA San Diego had an average of 25 personnel temporarily assigned each workday to the LB Det over the course of the year. The vast majority of work accomplished by the LB Det was the removal and installation of equipment (ship-to-shop jobs) transported to/from San Diego for repair. As stated above, this study captures only the costs of SIMA San Diego authorized billets. Therefore the labor costs associated with the personnel permanently assigned to the LB Det were not included. Further justification for excluding the costs of this labor is provided later when discussing the production hours used to allocate overhead costs.

The authorized manning for SIMA San Diego was obtained from the January 1996 Activity Manning Document (AMD). There is a difference of two enlisted

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[14]If the personnel in excess of SIMA's authorized manning were included, the expected increase in the manday rate would be $69.09 (total expected labor costs were $8,416,516). This was calculated using the annual labor costs of enlisted personnel and a uniform distribution. A uniform distribution is used because it is just as likely an E-9 could break a leg as it is for an E-4 to break a leg. Again, this is the random nature of the events which cause the assignment of these personnel to SIMA. The distribution for enlisted personnel on ships homeported in the San Diego area was not collected by the researcher so the probability of a person with a broken leg is an E-4 cannot be determined. The purpose of this calculation was simply to provide a feeling for the magnitude of the expected costs of these personnel, not a precise measurement of their expected cost.

It is also interesting to note that the $69.09 rate is approximately 10 percent of the composite manday rate calculated in Chapter IV and the 217 personnel which could cause this additional charge is approximately 10 percent of the manning.

billets between the 1995 and 1996 authorized manning. SIMA was authorized 1,786 enlisted personnel in 1995 and 1,788 for 1996. This difference is considered insignificant when computing the FY 95 manday rate.

The Activity Manning Document lists each authorized billet by individual Billet Sequence Codes (BSC). The BSCs are categorized by organizational units (departments, divisions, and shops) and list the grade or rate required for the billet as well as the position title. SIMA San Diego has changed some shop designations and uses some shop designations in addition to those listed in the AMD. The manning for the additional shops SIMA uses comes from the units manned in the AMD. For example, in FY 95 SIMA had a Nuclear Secondary Plant Repair Shop (38N) which was composed of personnel from the Pump Repair Shop (31G) and Valve Repair/Test Shop (31D). When determining the composition and costs of labor for individual shops, the AMD is the reference document with labor costs for the additional shops being captured in the parent or providing shop's labor costs. The parent shop also receives the production data for the subsidiary shop. In the example above, the Valve Shop received 50 percent of the earned and expended production hours and jobs completed for the Nuclear Secondary Plant Repair Shop while the Pump Repair Shop received the other 50 percent. Table 6 provides a summary of authorized manning and associated labor costs by department for SIMA San Diego. Appendix A provides complete manning and labor costs for all organizational units listed in the AMD.

B. SHOP PRODUCTION DATA

1. Maintenance Resource Management System

The Maintenance Resource Management System (MRMS) data base was used to collect production statistics for SIMA San Diego. These statistics are the expenditures of manhours and associated productivity ratios for the activity as a whole and for specific shop units. Appendix B provides definitions for the different categories

	OFFICERS	CHIEF PETTY OFFICERS	PETTY OFFICERS AND SEAMEN	GOVERN-MENT SERVICE	FEDERAL WAGE SYSTEM	TOTAL BILLETS	LABOR COST
EXECUTIVE DEPT TOTAL	2	2	1	11	0	16	$ 927,514
ADMIN/TRNG DEPT TOTAL	2	9	30	3	0	44	$ 1,800,775
PROD SUPPORT DEPT TOTAL	3	74	98	30	20	225	$ 10,053,800
REPAIR DEPT TOTAL	20	166	1,313	0	0	1,499	$ 56,107,932
SUPPLY DEPT TOTAL	3	13	82	39	0	137	$ 5,142,813
ACTIVITY TOTAL	30	264	1,524	83	20	1,921	$ 74,032,835

Table 6. Summary of Authorized Manning and Labor Costs

of manhours and the ratios used as well as their associated equations. All MRMS data was provided by SIMA San Diego Analysis Reports and Records (ARRS) office personnel as requested by the researcher.

The data collected from SIMA San Diego includes all of the jobs completed in FY 95 and the associated expended production hours. This includes jobs (and the associated hours) started in FY 94 which were completed in FY 95 but does not include jobs (and their associated hours) started in FY 95 to be finished in FY 96. While it is possible to determine the jobs carried over between fiscal years, it is not possible to determine the hours expended during the different years. The MRMS data base tracks hours associated with jobs and not by the date the hours were expended, so the total number of hours expended on the job can be determined; but when the

hours were expended cannot be determined.[15] It is assumed the number of jobs and their associated workloads carried into FY 95 and out to FY 96 are approximately the same. Because the earned production hours (which are also tracked by job and not date) will be used as the allocation basis for overhead, a significant difference in the amount of hours carried over between the two periods could cause the manday rate to be understated (if more hours were carried into FY 95 than hours carried out to FY 96) or overstated (if fewer hours were carried into FY 95 than hours carried out to FY 96).

Table 7 presents the total hours available to SIMA San Diego for FY 95 and how they were accounted for in the MRMS data base. The 21,119 miscellaneous manhours expended include 20,938 hours expended for quality assurance (which a NSY would not include in direct labor hours (DLHs)), with the remaining hours originating from the LB Det and the Tool Repair Shop. Hours for the LB Det are excluded from the allocation base because the labor costs for those personnel are not included in the costs. Hours expended by SIMA San Diego personnel temporarily assigned to the LB Det are included in the parent shops hours. The hours for the Tool Repair Shop (06B) are not included because this is considered a support shop whose mission is to repair and maintain the tools and equipment used by SIMA production personnel. The costs for this shop are considered indirect overhead and, therefore, these hours should not be included in the overhead allocation base.

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[15]An argument could be made to take the total number of hours expended on a job and divide that by the number of days the job was open to determine a daily average of hours expended. Using a daily average does not take into account time spent waiting for parts or higher priority jobs. It is possible that a job may be idle for several days while waiting for needed parts or because the workers assigned to the job have been reassigned to a higher priority job.

CATEGORY	HOURS	% OF TOTAL MANHOURS ASSIGNED		% OF GROSS PRODUCTION MANHOURS	AVAILABLE PRODUCTION MANHOURS
TOTAL MANHOURS ASSIGNED (INCLUDING OVERTIME)	3,882,791				
- GROSS SUPPORT MANHOURS	(1,934,918)	49.83	49.83		
=GROSS PRODUCTION MANHOURS	1,947,873	50.17			
-PRODUCTIVE MANHOUR DEDUCTIONS					
MEDICAL DEDUCTION	(40,724)	1.05	1.05	2.09	
ADMINISTRATIVE DEDUCTION	(44,468)	1.15	1.15	2.28	
LEAVE	(10,398)	0.27	0.27	0.53	
SPECIAL LIBERTY	(97,065)	2.50	2.50	4.98	
UNAUTHORIZED ABSENCE	(661)	0.02	0.02	0.03	
SCHEDULED TRAINING	(239,000)	6.16	6.16	12.27	
SPECIAL ASSIGNMENT	(224,366)	5.78	5.78	11.52	
OTHER	(25,963)	0.67	0.67	1.33	
MANHOUR DEDUCTIONS SUBTOTAL	(682,644)	17.58			
=NET AVAILABLE PRODUCTION MANHOURS	1,265,230	32.59			
- EXPENDED PRODUCTION MANHOURS (INCL LOST TIME)	(991,892)	25.55	25.55	50.92	78.40
- MISC MANHOURS EXPENDED	(21,119)	0.54	0.54	1.08	1.67
- MANHOURS UNASSIGNED TO JOBS	(97,746)	2.52	2.52	5.02	7.73
=UNACCOUNTED PRODUCTION TIME	154,473	3.98	3.98	7.93	12.21
TOTAL			100.00	100.00	100.00

Table 7. SIMA Manhours

The data presented for shop units for SIMA San Diego is limited to those shops which had authorized manning in the AMD. As discussed above, in the workforce composition section, some shops have been combined in this study. As were the labor costs, the expended and earned manhours and the jobs completed for shops which are not authorized manning in the AMD were added to the shop(s) from which the manpower was drawn. Productive ratios are shown for the parent shop only, with no adjustment made for any subsidiary shops. Table 8 provides a summary of the shops which were combined for this study.

Table 9 presents all of the production shop data collected from the MRMS data base for this study. As discussed above, the production shops used are those with an authorized manning in the AMD, with the total number of billets being those listed in the AMD. The percentage of production personnel is calculated using the gross production and gross support manhours available per shop and, in effect, taking the percentage of gross production hours compared to the gross hours available in the

SUBSIDIARY SHOP	PARENT SHOP
31C GOVERNOR/INJECTOR SHOP	31E IC ENGINE SHOP
38N NUCLEAR SHIP SECONDARY PLANT	31D VALVE REPAIR/TEST SHOP (1/2) 31G PUMP REPAIR SHOP (1/2)
67T TEMPEST REPAIR	67L COMPUTER REPAIR
67X LAN INSTALLATION	67L COMPUTER REPAIR
74Z UPHOLSTERY SHOP	74A SAIL LOFT/UPHOLSTERY SHOP
84C ADP REPAIR	67L COMPUTER REPAIR
84D MICRO/MINIATURE REPAIR	67M MICRO/MINIATURE REPAIR

Table 8. Combined Shops

repair shops.[16] The number of direct billets and indirect billets is calculated based on this percentage. The calculation of direct labor costs are also based on this percentage and may cause the specific shop manday rates to be misstated but does not affect the composite manday rate calculation. The possible misstatement of the specific shop rates is the result of using this percentage and the temporarily assigned personnel for which labor costs are not captured. The use of the percentage for calculating direct labor costs might result in an overstatement of the direct labor costs because all chief

[16]The actual calculation of this percentage used the following formulas:

$$Production\ Personnel = \frac{Gross\ Production\ Hours}{7.5\ manhours/day} \times 251\ workdays$$

$$Support\ Personnel = \frac{Gross\ Support\ Hours}{7.5\ manhours/day} \times 251\ workdays$$

$$\%\ of\ Production\ Personnel = \frac{Production\ Personnel}{Production\ Personnel + Support\ Personnel}$$

Table 9. Shop Production Data

SHOP	COST CENTER	TOTAL BILLETS	% OF PRODUCTION PERSONNEL	DIRECT BILLETS	INDIRECT BILLETS	JOBS COMPLETED AS LEAD WORK CENTER	HOURS EARNED (LEAD WORK CENTER)	HOURS EARNED (ASSIST WORK CENTER)	TOTAL HOURS EARNED	TOTAL MANDAY EARNED (MANHOURS DIVIDED BY 7.5)	HOURS EXPENDED (LEAD WORK CENTER)	HOURS EXPENDED (ASSIST WORK CENTER)	TOTAL HOURS EXPENDED	TOTAL MANDAY EXPENDED (MANHOURS DIVIDED BY 7.5)	DIFFERENCE (EXPENDED-EARNED MANHOURS)	% OF GROWTH / (SAVING)	AVERAGE MONTHLY PERFOR-MANCE RATIO	AVERAGE MONTHLY WORKLOAD	AVERAGE MONTHLY UTILIZA-TION	AVERAGE MONTHLY PRODUCT-IVITY	AVERAGE MONTHLY LOAD RATIO
11A	SHEETTER SHOP	82	74.19	61	21	1,553	42,631.6	6,008.7	50,640.3	6,752	67,093.1	10,721.5	77,814.6	10,375	27,174.3	53.66	68.25	66.42	59.00	40.58	99.75
12A	SHEETMETAL SHOP	40	74.42	30	10	1,217	22,686.7	3,113.2	25,799.9	3,440	22,998.7	2,715.2	25,623.9	3,417	(176.0)	(0.68)	101.58	101.58	61.50	63.17	99.92
26A	WELDING SHOP	16	77.78	12	4	72	1,840.3	8,365.9	10,206.2	1,361	2,009.5	9,581.0	11,590.5	1,545	1,384.3	13.56	70.17	94.50	55.67	38.25	74.92
26Z	WELDING REQUAL SCHOOL	2	33.33	1	1	53	5,302.0	0.0	5,302.0	707	3,365.8	0.0	3,365.8	449	(1,936.2)	(36.52)	62.83	63.17	20.83	45.92	41.33
31A	INSIDE MACHINE SHOP	65	74.31	63	22	304	9,185.1	36,783.1	45,968.2	6,129	12,615.5	44,149.5	56,765.0	7,569	10,796.8	23.49	91.58	92.67	50.92	45.92	98.83
31B	MECHANICAL ENGRAVING	4	100.00	4	0	183	2,015.2	707.7	2,722.9	363	1,991.0	703.0	2,694.0	359	(28.9)	(1.06)	99.00	100.00	64.83	62.00	95.75
31D	VALVE REPAIR/TEST (1/2 38N)	66	77.65	51	15	2,031	41,282.1	797.8	42,079.9	5,611	46,313.9	1,290.3	49,604.2	6,614	7,524.3	17.88	74.17	90.33	66.67	49.08	84.67
31E	IC ENGINE SHOP (31C)	51	84.62	43	8	636	36,078.9	1,070.6	37,149.4	4,953	36,113.1	1,090.0	37,203.1	4,960	53.7	0.14	68.33	98.25	58.25	40.67	68.92
31F	HYDRAULIC REPAIR SHOP	15	75.00	11	4	226	4,856.7	717.3	5,574.0	743	6,429.6	711.0	7,140.6	952	1,566.6	28.11	45.50	59.08	44.92	19.92	76.67
31G	PUMP REPAIR (1/2 38N)	76	71.54	54	22	681	42,387.5	178.3	42,565.8	5,675	69,784.1	611.0	70,395.1	9,386	27,829.3	65.39	84.50	66.00	58.83	37.08	98.08
31H	AUXE REPAIR	16	77.08	14	4	127	22,591.3	23.0	22,614.3	3,015	24,056.6	15.0	24,071.6	3,210	1,457.3	6.44	83.42	86.58	53.42	45.00	96.17
31T	GAS TURBINE REPAIRS	24	83.87	20	4	385	43,181.6	158.0	43,339.6	5,779	40,191.4	117.0	40,308.4	5,374	(3,931.2)	(8.89)	103.75	105.75	76.33	79.00	98.17
31Z	METAL BUILD UP SHOP	12	66.67	10	2	5	124.0	7,323.5	7,447.5	993	101.5	6,099.0	6,200.5	827	(1,247.0)	(16.74)	77.42	114.00	53.92	41.42	68.00
35A	OPTICAL SHOP	8	78.57	6	2	491	6,902.6	0.0	6,902.6	920	6,197.0	0.0	6,197.0	826	(705.6)	(10.22)	102.83	105.00	55.00	57.67	97.92
35D	WATCH/CLOCK REPAIR	2	0.00	0	2	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
35E	TYPEWRITER REPAIR	2	0.00	0	2	2	1.9	0.0	1.9	0	1.0	0.0	1.0	0	(0.9)	(47.37)	0.00	0.00	0.00	0.00	0.00
37A	PRINT SHOP	9	68.75	6	3	446	11,153.0	240.1	11,393.1	1,519	8,577.5	207.0	8,784.5	1,171	(2,908.6)	(22.90)	156.42	156.75	75.75	117.58	99.83
38A	AUXILIARY SHOP	44	78.95	35	9	802	28,233.3	1,577.1	29,810.4	3,975	48,515.5	2,379.0	50,894.5	6,786	21,084.1	70.73	58.17	58.42	53.42	31.17	98.83
38B	ORDNANCE REPAIR	45	84.48	38	7	385	29,408.2	0.0	29,408.2	3,921	29,419.5	0.0	29,419.5	3,923	11.3	0.04	79.08	99.17	53.83	43.58	79.75
38Y	ORDNANCE ALTERATION	16	80.00	13	3	676	8,736.6	18.0	8,754.6	1,167	9,146.0	18.0	9,164.0	1,222	409.4	4.68	89.42	83.17	54.75	38.75	83.42
38Z	AIR COMPRESSOR/ALIGNMENT SHOP	14	78.57	11	3	186	10,815.9	3,794.0	14,610.5	1,948	11,781.5	3,928.1	15,709.6	2,095	1,099.1	7.52	93.17	93.42	51.67	48.25	99.75
41A	BOILER REPAIR SHOP	60	76.67	46	14	853	39,469.7	1,226.1	40,695.8	5,426	40,027.1	1,269.3	41,296.4	5,506	600.6	1.48	73.25	87.42	55.42	41.08	84.58
41B	BOILER OUTSIDE REPAIR	18	77.27	14	4	168	4,317.4	732.0	5,049.4	673	4,303.6	739.0	5,042.6	672	(6.8)	(0.13)	52.58	96.75	38.67	21.17	53.92
51A	INSIDE ELECTRICAL	62	76.00	47	15	310	16,781.2	1,884.2	18,665.4	2,489	21,086.8	2,602.5	23,689.3	3,159	5,023.9	26.92	70.92	79.58	57.92	41.00	89.83
51B	OUTSIDE ELECTRICAL	50	71.43	36	14	636	19,648.9	2,982.9	22,631.8	3,044	25,784.5	3,879.5	29,664.0	3,955	6,032.2	29.92	79.92	79.92	79.83	63.83	100.00
51G	GYRO/C REPAIR	45	75.61	34	11	300	14,556.5	891.5	15,448.0	2,060	12,209.6	835.5	13,045.1	1,739	(2,402.9)	(15.55)	82.42	111.67	43.00	36.08	72.25
51H	CABLE INSPECTION	9	69.33	8	2	21	11,227.0	167.6	11,394.6	1,519	8,784.5	107.5	8,892.0	1,186	(2,502.6)	(21.96)	128.50	126.58	67.83	86.42	99.92
56A	PIPEFITTING SHOP	50	73.33	37	13	726	12,823.6	4,184.8	17,008.4	2,268	17,807.0	4,843.6	22,650.6	3,020	5,642.2	33.17	77.33	77.42	51.33	38.17	99.83
56B	AC&R SHOP	35	81.63	29	6	179	8,998.6	2,065.9	11,064.5	1,475	11,907.8	2,017.9	13,925.7	1,857	2,861.2	25.86	87.08	82.92	44.00	21.67	82.75
56C	FLEXIBLE HOSE SHOP	17	76.19	13	4	1,008	11,694.2	759.8	12,454.0	1,661	11,376.3	825.5	12,201.8	1,627	(252.2)	(2.03)	94.82	102.08	59.17	57.17	92.50
57A	LAGGING SHOP	52	79.55	41	11	1,130	14,062.7	20,802.6	34,865.3	4,649	13,973.5	20,912.9	34,886.4	4,652	21.1	0.06	98.25	99.00	76.17	74.83	99.25
64A	PATTERN SHOP	11	75.00	8	3	11	1,581.0	6,332.7	7,913.7	1,055	1,478.5	5,635.6	7,114.1	949	(799.6)	(10.10)	102.92	103.17	65.08	66.92	99.75
64E	KEY & LOCK SHOP	2	80.00	2	0	298	6,026.9	47.1	6,074.0	810	5,416.0	54.0	5,470.0	729	(604.0)	(9.94)	104.17	104.67	58.75	62.33	99.50
67A	ELECTRONICS REPAIR	31	81.82	25	6	395	15,212.5	48.2	15,260.7	2,035	13,922.2	45.5	13,967.7	1,862	(1,293.0)	(8.47)	97.50	107.50	47.75	46.17	90.58
67B	ELECTRONICS CAL LAB	14	84.21	12	2	1,008	13,989.7	1,402.1	15,391.8	2,052	12,980.4	1,294.1	14,274.5	1,903	(1,117.3)	(7.26)	100.67	102.67	71.08	71.42	98.08
67D	TELETYPE REPAIR SHOP	14	100.00	14	0	12	423.5	0.0	423.5	56	436.0	0.0	436.0	58	12.5	2.95	36.75	36.75	11.58	10.83	50.00
67E	FIRE CONTROL SHOP	21	85.19	18	3	133	17,308.5	684.9	17,993.4	2,399	17,859.5	475.5	18,335.0	2,445	341.6	1.90	99.58	107.33	71.42	71.50	93.08
67G	SONAR REPAIR SHOP	10	77.78	8	2	24	1,495.2	62.0	1,557.2	208	1,544.5	61.0	1,605.5	214	48.3	3.10	42.33	76.92	50.08	22.58	43.92
67H	ANTENNA REPAIR SHOP	30	77.78	23	7	532	12,409.5	1,494.9	13,904.4	1,854	12,427.1	1,504.0	13,931.1	1,857	26.7	0.19	95.92	98.00	52.00	49.92	99.92
67K	TEST EQUIPMENT REPAIR	10	75.00	8	3	643	11,109.4	105.1	11,214.5	1,495	11,433.3	101.2	11,534.5	1,538	320.0	2.85	102.17	103.75	58.42	59.67	99.00
67L	COMPUTER REPAIR (84C) (87X) (67T)	11	78.17	9	2	502	13,397.7	0.0	13,397.7	1,786	11,589.1	0.0	11,589.1	1,545	(1,808.6)	(13.50)	122.58	122.58	54.83	67.08	100.00
67M	MICRO MINIATURE REPAIR (84D)	10	76.47	8	2	35	1,419.3	2,024.9	3,444.2	459	1,340.0	2,071.0	3,411.0	455	(33.2)	(0.96)	56.42	76.67	56.08	32.42	72.58
67W	SLQ-32 REPAIR	17	81.25	14	3	68	8,490.2	0.0	8,490.2	1,132	7,252.5	0.0	7,252.5	967	(1,237.7)	(14.58)	93.58	104.50	58.67	53.67	89.17
68C	LIFE RAFT REPAIR	19	75.00	14	5	123	11,449.6	0.0	11,449.6	1,527	11,450.4	0.0	11,450.4	1,527	0.8	0.01	93.00	95.33	59.92	56.25	97.25
71B	CORROSION CONTROL	34	77.78	28	6	777	23,392.4	6,011.9	29,404.3	3,921	22,051.9	5,904.9	27,956.8	3,728	(1,447.5)	(4.92)	98.75	98.75	74.17	73.33	100.00
72A	OUTSIDE RIGGING	28	74.51	21	7	78	1,125.4	21,588.6	22,714.0	3,029	1,157.7	20,914.1	22,071.8	2,943	(642.2)	(2.83)	68.17	83.33	60.67	40.33	80.75
72C	INSIDE RIGGING	12	70.00	8	4	328	6,664.0	543.6	7,207.6	961	6,385.0	712.0	7,097.0	946	(110.6)	(1.53)	89.58	97.33	53.58	44.33	87.75
72D	WEIGHT TESTING SHOP	6	63.64	4	2	918	4,443.4	3,018.6	7,462.0	995	3,413.2	2,267.8	5,681.0	757	(1,781.0)	(23.87)	132.50	134.08	80.17	107.42	98.58
74A	SAIL LOFT/UPHOLSTERY (74Z)	19	69.23	13	6	976	24,717.8	316.4	25,034.2	3,338	18,952.1	178.5	19,130.6	2,551	(5,903.6)	(23.58)	117.92	118.17	78.46	88.13	99.83
81A	FOUNDRY SHOP	12	61.25	10	2	3	142.0	16,330.7	16,472.7	2,196	165.0	12,481.7	12,646.7	1,686	(3,826.0)	(23.23)	128.67	128.75	79.42	101.25	99.92
92A	SOUND ANALYSIS	8	78.57	6	2	15	120.5	4,996.8	5,117.3	682	129.5	4,979.0	5,108.5	681	(8.8)	(0.17)	87.67	96.50	50.08	40.92	86.75
95B	TEST/SPECTRO LAB	2	66.67	1	1	4	146.0	5,952.9	6,110.9	815	108.5	4,473.5	4,582.0	611	(1,528.9)	(25.02)	158.17	158.75	69.67	109.33	99.58
96A	MRCS LAB	17	75.00	13	4	1,516	14,203.1	75.3	14,278.4	1,904	12,412.2	53.0	12,465.2	1,662	(1,813.2)	(12.70)	113.58	116.00	63.25	71.08	98.33
96B	OUTSIDE CALIBRATION	26	81.69	24	2	68	21,543.9	28.1	21,572.0	2,876	16,493.2	46.3	16,539.5	2,205	(5,032.5)	(23.33)	72.83	98.67	71.25	53.58	74.50
	TOTAL	1,393		1,077	316	24,243	734,007.7	179,649.1	913,656.8	121,821	806,270.3	185,621.5	991,891.8	132,252	78,235.0	8.56	83.25	90.25	58.83	48.67	91.50

petty officers and above are considered support personnel, with some E-6 and below personnel also performing support functions. Because the majority of support personnel are the higher ranking, and therefore higher paid, personnel the use of a percentage may not remove all support labor costs, resulting in an overstatement of direct labor costs. Additionally, because SIMA San Diego has the temporarily assigned personnel, who are used mostly in support roles, the number of support hours may be overstated in comparison with the production hours, which would lead to an understatement of direct labor costs. This difference is considered insignificant because it does not impact the SIMA composite manday rate. Appendix C contains manday rates for the specific shops which allocate shop indirect labor directly to the shop (that is, total shop labor costs are used instead of direct and indirect labor costs).

The Total Hours Earned for each shop presented in Table 9 are the basis on which overhead allocations are made. The choice to use earned hours for the allocation base was made due to the similarity to budgeted direct labor hours (DLHs) used by a NSY. A NSY determines its manday rate based on the budgeted DLHs for the fiscal year, which are determined from the amount and type of work planned. Each repair action has an engineering standard for completing (e.g., overhaul of a pump requires 42 manhours) and the NSY knows approximately the type and amount of work it is expected to accomplish during the year.[17] Earned hours at an IMA are the standard amount of hours required to complete different steps of a repair action (e.g., all of the steps required to overhaul a pump might earn SIMA shops 42 manhours). Expended hours by shop were also collected in order to calculate a net

[17]The process for budgeting NSY DLHs is more complicated than presented here. It is actually a process of negotiations with the customer based on the required work and the available funds. While engineering standards are used, the NSY tries to complete the work using less time than the standards, creating reserve hours and thus allowing room for growth in scope and new work. The use of these reserve hours is negotiated with the customer.

operating result for SIMA San Diego. A NSY determines its manday rate based on budgeted DLHs and charges its customers for actual DLHs and, at the end of the fiscal year, has a net operating result. If, for SIMA San Diego, the earned manhours are used for determining the manday rate to be charged, then the manday rate multiplied by the expended mandays (expended manhours converted into mandays) will provide the revenues for FY 95. This can then be used to determine the net operating result.

The difference between earned manhours and expended manhours is due to differences in the actual time expended on a repair and growth in the scope of repairs. The earned hours are, again, based on standards, so the actual time expended to complete the maintenance will vary. Growth in scope occurs when more repairs are necessary than planned based on the description of the symptoms or required repairs. This difference in hours does not represent new work growth or emergent work. New and emergent work are not addressed as separate categories in this study but are included in the earned and expended hour totals.

C. SIMA SAN DIEGO APPROPRIATED FUNDS

This section presents all of the appropriated funds and assets received or managed by SIMA San Diego during FY 95. The sources of these funds and assets vary from SIMA's direct operating budget to the Military Personnel (Navy) Account to assets acquired from other military organizations at no cost to SIMA. These funds are categorized into direct, indirect and general and administrative expenses for the purposes of allocating overhead. Some of the money included does not actually flow through SIMA San Diego but is provided by other sources. Military pay and equipment and services provided by the Naval Sea Systems Command (NAVSEA) provide funding for operations. They do not appear in SIMA San Diego's operating budget but are included in this study. Some funds managed by SIMA are excluded

from this study because they provide benefits to commands other than SIMA San Diego and are managed by SIMA solely for convenience. The Enhanced Readiness Support Group (ERSG), the CNSP Navy Stock Fund Management Assist Team (NSF/MAT) and SIMA Everett are the commands for which SIMA San Diego manages funds.

The accounting representation made here of SIMA San Diego is not true to the actual flow of funds through this activity. The presentation here is what happened economically at SIMA San Diego. For example, in the account structure used by SIMA the Supply Department pays for all civilian labor costs, while the presentation here shows that the departments which receive the benefits of civilian labor as providing the funds for that labor. Specific details of this are discussed below in the sections on the different funds used by SIMA San Diego. Table 10, which is continued horizontally across two pages, provides the accounting presentation of SIMA San Diego the researcher has chosen to use.

DBOF activities charge certain costs which are directly attributable to specific contracts to the customer in addition to the manday rate (DoD INST 7000.14-R, Volume 11B, Chapter 63, pp. 63-13-15). This, in effect, is a time plus materials and services contract. The direct costs include the repair parts and materials used, contract and travel costs and purchased services (subcontractors, hotel services, etc.). These direct costs are not included in overhead pools used for calculating allocation rates. Excluded costs in this study are Quality Assurance (R-8) Division labor and operating costs, costs for crane operations and rentals, some travel and per diem costs and costs for the storage and shipping of degradable parts or equipment. Because SIMA records provide only the aggregate costs of services provided and do not report costs of individual jobs, it is not possible to accurately separate direct from overhead costs (e.g., how much of the $1,134,036 spent for crane services should be allocated

in SIMA overhead and how much should have been charged directly to customers?). Additionally, there are overhead costs associated with administering or providing these services which cannot easily be separated from the total overhead pools (e.g., the Training Department manages the travel money but also performs many other functions. How much of the overhead generated by this department should be included with direct travel costs?). Because of the relatively small amounts in question (the excluded costs are approximately 3.2 percent of total operating costs or 8.7 percent of overhead costs) and the relatively high proportion of these amounts which are probably direct costs, all of the costs for these categories have been excluded from the calculation of overhead rates. Inclusion of all of these direct items in the overhead pools would increase the calculated manday rate by approximately $30.

As previously mentioned, SIMA San Diego operated a detachment of personnel at Long Beach Naval Shipyard. Items in Table 10 which were costs directly identifiable with the LB Det are annotated as such. These costs (excluding travel costs) are collected into the overhead cost pools. A summary of the LB Det treatment in this study would be simply that all costs associated with the LB Det are captured, with the exception of military labor and production efforts for those personnel permanently assigned to Long Beach. The costs (excluding SIMA San Diego labor costs) directly associated with the LB Det are $287,277, of which $200,848 were considered costs directly chargable to customers. The remainder, $86,429, contributed $0.709 to the calculated manday rate for SIMA San Diego.

An additional caveat should be placed on the dollar amounts provided in this study. Most of the figures obtained were from documents which presented the FY 95 obligations for the different funds, while some of the documents used in compiling

SIMA SAN DIEGO APPROPRIATED FUNDS													
FUND	SUPPLY & EQUIPAGE				ROV(P)		ROV(S)		TAD/TAR				
CATEGORY	INDIRECT	G&A	DIRECT	OTHER COMMAND	INDIRECT	DIRECT	DIRECT	OTHER COMMAND	INDIRECT	G&A	DIRECT	OTHER COMMAND	
SAFETY	$ -	$ 120,871	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ADMIN (INCLUDING CO,XO,CMC)	$ -	$ 67,229	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,065	$ -	$ -	
TRAINING/RESERVES	$ -	$ 60,765	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
PRODUCTION SUPPORT	$ 5,050	$ -	$ -	$ -	$ -	$ 1,741	$ -	$ -	$ -	$ -	$ -	$ -	
R-6 DIV (WORK ACCEPTANCE)	$ 6,184	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-7 DIV (ENG/DESIGN)	$ 11,789	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-8 DIV (OA)	$ -	$ -	$ 31,847	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-9 DIV (PLANNING)	$ 32,746	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SUBTOTAL	$ 55,769	$ -	$ 31,847	$ -	$ -	$ 1,741	$ -	$ -	$ -	$ -	$ -	$ -	
REPAIR	$ 67,510	$ -	$ -	$ -	$ -	$ 26,012,387	$ 4,167,129	$ -	$ 94,903	$ -	$ 15,369	$ -	
SIMA TOOLS	$ -	$ -	$ -	$ -	$ 18,249	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-1 DIV (HULL)	$ 51,744	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-2 DIV (MACHINERY)	$ 78,437	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-3 DIV (ELECTRICAL)	$ 35,889	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-4 DIV (COMBAT SYSTEMS)	$ 32,406	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
R-5 DIV (SERVICES)	$ 35,024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
INTERMEDIATE AVAILABILITY	$ 19	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
LB DET	$ 29,028	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,356	$ -	$ 99,079	$ -	
SUBTOTAL	$ 330,057	$ -	$ -	$ -	$ 18,249	$ 26,012,387	$ 4,167,129	$ -	$ 97,259	$ -	$ 114,448	$ -	
SUPPLY	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,519	$ -	$ -	
FISCAL	$ -	$ 368,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SUPPLY MATERIAL	$ 20,537	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
STOCK CONTROL	$ 10,254	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
INDUSTRIAL SUPPORT	$ 19,556	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ADP	$ 222,567	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
HAZ WASTE	$ 343,077	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
PURCH	$ 13,864	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
AWARDS	$ -	$ 4,562	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ENV PROT	$ 340,476	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SUBTOTAL	$ 970,333	$ 373,242	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,519	$ -	$ -	
FACILITIES	$ 380,666	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
REAL PROPERTY MAINTENANCE	$ 936,918	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
TELEPHONE	$ 324,108	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
TRASH	$ 36,634	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ELECTRIC	$ 631,624	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
WATER	$ 23,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SEWAGE	$ 16,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
STEAM	$ 170,344	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
NATURAL GAS	$ 30,296	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
COMP AIR	$ 2,313	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
MAINT/REP SHOP EQUIP	$ 1,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
WEIGHT HANDLING EQUIP	$ 65,881	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
PHONES (LB)	$ 20,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SUBTOTAL	$ 2,639,384	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
EBIS	$ -	$ -	$ -	$ 191,752	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 17,665	
NSF/MAT	$ -	$ -	$ -	$ 357,583	$ -	$ -	$ -	$ 3,000	$ -	$ -	$ -	$ -	
TOL		$ 23,314	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ROV (INDIRECT)	$ -	$ -	$ -	$ -	$ 3,408,499	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
VEHICLE RENT (LB)	$ -	$ -	$ -	$ -	$ 28,410	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
CRANE (LB)	$ -	$ -	$ -	$ -	$ -	$ 75,136	$ -	$ -	$ -	$ -	$ -	$ -	
CRANE RENTAL	$ -	$ -	$ -	$ -	$ -	$ 48,826	$ -	$ -	$ -	$ -	$ -	$ -	
CRANE SERVICES	$ -	$ -	$ -	$ -	$ -	$ 1,134,046	$ -	$ -	$ -	$ -	$ -	$ -	
SANDBLASTING	$ -	$ -	$ -	$ -	$ -	$ 63,930	$ -	$ -	$ -	$ -	$ -	$ -	
MAINT/VEH FORKLIFT	$ -	$ -	$ -	$ -	$ 324,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SHORE POWER CABLES	$ -	$ -	$ -	$ -	$ -	$ 111,738	$ -	$ -	$ -	$ -	$ -	$ -	
PACKING/PRESERVATION	$ -	$ -	$ -	$ -	$ -	$ 38,229	$ -	$ -	$ -	$ -	$ -	$ -	
REFUSE	$ -	$ -	$ -	$ -	$ 1,051	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
FUEL (LB)	$ -	$ -	$ -	$ -	$ 2,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
CRANE RENTAL (LB)	$ -	$ -	$ -	$ -	$ -	$ 26,633	$ -	$ -	$ -	$ -	$ -	$ -	
FORKLIFT MAINT (LB)	$ -	$ -	$ -	$ -	$ 332	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
STEAM (LB)	$ -	$ -	$ -	$ -	$ 1,521	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
ELECTRICITY (LB)	$ -	$ -	$ -	$ -	$ 27,913	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
FRESH WATER (LB)	$ -	$ -	$ -	$ -	$ 929	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SEWAGE (LB)	$ -	$ -	$ -	$ -	$ 2,681	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
COMP AIR (LB)	$ -	$ -	$ -	$ -	$ 1,032	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
NATURAL GAS (LB)	$ -	$ -	$ -	$ -	$ 911	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SUBTOTAL	$ -	$ -	$ -	$ -	$ 3,799,979	$ 1,498,538	$ -	$ -	$ -	$ -	$ -	$ -	
TECHAVAIL	$ -	$ -	$ -	$ -	$ 793,336	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
SIMA EVERETT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,397	
EMERGENCY LEAVE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,974	$ -	
TOTAL	$ 3,995,543	$ 645,421	$ 31,847	$ 549,335	$ 4,611,564	$ 27,512,666	$ 4,167,129	$ 3,000	$ 97,259	$ 44,584	$ 142,422	$ 28,062	

Table 10. Appropriated Funds

SIMA SAN DIEGO APPROPRIATED FUNDS												
FUND	OTHER FUNDING		MILITARY LABOR			CIVILIAN LABOR					
CATEGORY	INDIRECT	(EQUIPMENT PURCHASES)	INDIRECT	G&A	DIRECT	INDIRECT	G&A	DIRECT	LINE TOTAL	CATEGORY TOTALS
SAFETY	$ -	$ -	$ -	$ -	$ -	$ -	$ 434,668	$ -	$ 555,539	$ 555,539
ADMIN (INCLUDING CO,XO,CMC)	$ -	$ -	$ -	$ 1,771,233	$ -	$ -	$ 216,343	$ -	$ 2,079,870	$ 2,079,870
TRAINING/RESERVES	$ -	$ -	$ -	$ 306,046	$ -	$ -	$ -	$ -	$ 366,811	$ 366,811
PRODUCTION SUPPORT	$ -	$ -	$ 757,697	$ -	$ -	$ 27,119	$ -	$ -	$ 791,607	
R-6 DIV (WORK ACCEPTANCE)	$ -	$ -	$ 284,152	$ -	$ -	$ 258,419	$ -	$ -	$ 548,755	
R-7 DIV (ENG/DESIGN)	$ -	$ -	$ 588,787	$ -	$ 55,735	$ 1,079,972	$ -	$ -	$ 1,736,283	
R-8 DIV (QA)	$ -	$ -	$ -	$ -	$ 1,878,710	$ -	$ -	$ 174,503	$ 2,085,060	
R-9 DIV (PLANNING)	$ -	$ -	$ 2,586,876	$ -	$ -	$ 480,636	$ -	$ -	$ 3,100,258	
SUBTOTAL	$ -	$ -	$ 4,217,512	$ -	$ 1,934,445	$ 1,846,146	$ -	$ 174,503		$ 8,261,963
REPAIR	$ 27,755	$ -	$ 2,380,668	$ -	$ -	$ -	$ -	$ -	$ 32,737,966	
SIMA TOOLS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,249	
R-1 DIV (HULL)	$ -	$ 245,680	$ 3,719,509	$ -	$ 8,991,804	$ -	$ -	$ -	$ 13,008,737	
R-2 DIV (MACHINERY)	$ -	$ 471,251	$ 5,152,711	$ -	$ 15,215,681	$ -	$ -	$ -	$ 20,918,080	
R-3 DIV (ELECTRICAL)	$ -	$ -	$ 1,923,902	$ -	$ 4,800,326	$ -	$ -	$ -	$ 6,760,117	
R-4 DIV (COMBAT SYSTEMS)	$ -	$ -	$ 2,384,912	$ -	$ 7,186,115	$ -	$ -	$ -	$ 9,603,433	
R-5 DIV (SERVICES)	$ -	$ 87,157	$ 1,313,888	$ -	$ 3,038,416	$ -	$ -	$ -	$ 4,474,485	
IMAV	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19	
LB DET	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 130,463	
SUBTOTAL	$ 27,755	$ 804,088	$ 16,875,590	$ -	$ 39,232,342	$ -	$ -	$ -		$ 87,679,304
SUPPLY	$ -	$ -	$ -	$ 1,003,341	$ -	$ -	$ 27,119	$ -	$ 1,049,979	
FISCAL	$ -	$ -	$ -	$ 70,556	$ -	$ -	$ 205,628	$ -	$ 644,864	
SUMAT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,537	
SUCONT	$ -	$ -	$ 1,747,030	$ -	$ -	$ 49,710	$ -	$ -	$ 1,806,994	
INDSUP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,558	
ADP	$ 175,862	$ -	$ 817,944	$ -	$ -	$ 573,979	$ -	$ -	$ 1,817,407	
HAZ WASTE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 343,077	
PURCH	$ -	$ -	$ 70,556	$ -	$ -	$ 576,949	$ -	$ -	$ 661,369	
AWARDS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,562	
ENV PROT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 340,476	
SUBTOTAL	$ 175,862	$ -	$ 2,635,530	$ 1,073,897	$ -	$ 1,200,638	$ 232,747	$ -		$ 6,681,068
FACILITIES	$ -	$ -	$ 1,579,684	$ -	$ -	$ 301,510	$ -	$ -	$ 2,261,860	
REAL PROPERTY MAINTENANCE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 936,918	
TELEPHONE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 324,108	
TRASH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 36,634	
ELECTRIC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 631,624	
WATER	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 23,500	
SEWAGE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,000	
STEAM	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 170,344	
NATURAL GAS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,296	
COMP AIR	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,313	
MAINT/REP SHOP EQUIP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100	
WEIGHT HANDLING EQUIP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 65,881	
PHONES (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000	
SUBTOTAL	$ -	$ -	$ 1,579,684	$ -	$ -	$ 301,510	$ -	$ -		$ 4,520,578
ERSG	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 209,417	$ 209,417
NSF/MAT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 360,583	$ 360,583
TQL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 23,314	$ 23,314
ROVI	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,408,499	
VEHICLE RENT (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 28,410	
CRANE (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 75,136	
CRANE RENTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 48,826	
CRANE SERVICES	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,134,046	
SANDBLASTING	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 63,930	
MAINT/VEH FORKLIFT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 324,000	
SHORE POWER CABLES	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 111,738	
PACKING/PRESERVATION	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 38,229	
REFUSE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,051	
FUEL (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,700	
CRANE RENTAL (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 26,633	
FORKLIFT MAINT (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 332	
STEAM (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,521	
ELECTRICITY (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,913	
FRESH WATER (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 929	
SEWAGE (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,681	
COMP AIR (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,032	
NATURAL GAS (LB)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 911	
SUBTOTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ 5,298,517
TECHAVAIL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 793,336	$ 793,336
SIMA EVERETT	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,397	$ 10,397
EMERGENCY LEAVE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,974	$ 27,974
TOTAL	$ 203,617	$ 804,088	$ 25,308,316	$ 3,151,176	$ 41,166,787	$ 3,348,294	$ 883,758	$ 174,503	$ 116,869,371	$ 116,869,371

Table 10. (Continued)

this data presented the FY 95 expenditures. This was necessary because detailed obligation data was not available for certain items.[18] This difference is less than $10,000 (obligations were greater than expenditures), but would probably be somewhat larger if actual expenditures were used for all funds. Because the amounts where expenditures were used, totaling $2,764,095, are such a small portion of the total funds (excluding other commands funds and military labor) managed by SIMA, $45,099,605, this difference is considered negligible for the purposes of this study.

1. Supply and Equipage

Supply and Equipage (S&E) funds are used to replenish the operating supplies required for SIMA San Diego (such as paper), except for supplies required for direct production efforts (such as lubricants for machinery). These funds are almost exclusively overhead items. The Quality Assurance Division's S&E budget has been categorized as an item to be charged directly to the customer, as discussed above. The Facilities category was created as a convenient way to summarize facility maintenance and operating costs. In the SIMA account structure, facility funds are an account in the Supply Department S&E account and the Real Property Maintenance is an S&E account itself. In the presentation of categories in Table 10 these have been combined into Facilities (and removed from other areas as appropriate).

2. Repair Other Vessel (Primary)

Repair Other Vessel Primary (ROV(P)) are the funds used for direct production efforts on active ships and for replenishing consumable items required to maintain the equipment (such as lubricants for machinery). The largest portion of this fund is used to purchase materials and replacement parts (both direct costs) necessary

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[18]These items include most utility costs (including LB Det), trash and refuse collection and the ROVI direct costs (crane services, shore power cables, etc.) listed in Table 10.

to complete repairs, with a very small portion being categorized as indirect expenses. SIMA San Diego's Supply Department purchases the hand tools which are used in repair efforts, but in this study those funds have been charged to the Repair Department to more accurately reflect the use of the funds rather than the flow of funds. The items in this fund which can be directly attributable to specific jobs would be charged to the customer in addition to the manday rate.

3. Repair Other Vessel (Secondary)

Repair Other Vessel Secondary (ROV(S)) funds are used for providing materials to effect repairs on reserve ships. All of these funds are categorized as direct funds with the ROV(P) fund account capturing all of the overhead costs for both active and reserve units. The NSF/MAT also has some funds for reserve ships managed by SIMA in this category.

4. Travel and Training Funds

Temporary Additional Duty (TAD) and Temporary Active Reserves (TAR) direct costs were based on estimates of equivalent travel costs for the Enhanced Readiness Support Group (ERSG). In most cases, whenever a SIMA maintenance person was sent to perform repairs in another location (excluding Long Beach), a representative from ERSG was also sent. The amount of direct travel costs for SIMA Repair Department ($15,369) were estimated to be the same as ERSG travel costs ($17,665), excluding emergency leave ($2,296). All travel and per diem costs associated with SIMA personnel being temporarily assigned to Long Beach were considered direct costs which would be charged to the customer for the associated jobs and therefore not included as overhead. SIMA Everett and ERSG also had TAD/TAR funds managed by SIMA San Diego.

5. Other Funding

The Other Funding category includes the significant services and equipment provided by other commands for which SIMA San Diego does not provide

reimbursement. These include $175,862[19] for MRMS system upkeep, $27,755 in non-depreciable equipment acquisition and $804,068 in depreciable equipment acquisition. The funds used for the MRMS maintenance and non-depreciable equipment purchases were included in the overhead costs for SIMA, while those funds used for depreciable equipment acquisition were not. These costs are captured in the depreciation expense. Table 11 provides a summary of the sources of equipment acquired in FY 95 and their associated values. Only those items with an acquisition value of greater than $50,000 are considered depreciable.

SOURCE	ITEM	ACQUISITION VALUE
NAVY REGIONAL CONTRACTING CENTER, WASHINGTON D.C.	LATHE, WOODWORKING	$ 44,900
NAVY REGIONAL CONTRACTING CENTER, WASHINGTON D.C.	LATHE, WOODWORKING	$ 90,370
NAVY REGIONAL CONTRACTING CENTER, WASHINGTON D.C.	TORQUE PUMP SYSTEM	$ 40,000
NAVAL SEA SYSTEMS COMMAND	LATHE, CNC	$144,221
NAVAL SEA SYSTEMS COMMAND	MILLING MACHINE	$ 27,540
NAVAL SEA SYSTEMS COMMAND	MILLING MACHINE	$ 69,180
NAVAL SEA SYSTEMS COMMAND	MILLING MACHINE	$ 27,540
NAVAL SEA SYSTEMS COMMAND	MILLING MACHINE	$ 27,500
ENGINEERING FIELD ACTIVITY, SOUTHWESTERN DIVISION, NAVFAC	OVEN, BURN OFF	$ 87,157
USS JASON (DECOM TRANSFER)	PIPE BENDER	$245,689

Table 11. External Equipment Sources and Values

[19]This amount was provided by NAVSEA 0435. The methodology used to obtain this number was to total all of the contractor costs for FY 95 associated with MRMS and then allocate these costs equally to all of the IMAs which use the MRMS system. No NAVSEA administration costs were included.

6. Military Labor

Military labor costs were calculated as discussed in the section on labor costs above. The determination of amounts for direct and indirect labor costs were made using the percentage of production personnel in each shop. The potential errors associated with this method were discussed in the section on MRMS data. For the Quality Assurance Division, all labor costs were considered costs charged directly to the customer. The remaining direct labor costs were used in determining the manday rate by including these costs as direct labor costs for each shop.

7. Civilian Labor

The civilian labor costs were determined by using the budget process for base pay used by SIMA San Diego. The fringe benefits were calculated using an adjusted rate from LBNSY. This is discussed in more detail in the section on workforce composition above. The only civilian labor costs categorized as direct costs were the costs associated with the Quality Assurance Division.

8. Calculation of Overhead Rates for Internal Costs

This section will provide the overhead allocation rates for the funds which flowed through SIMA San Diego. Equipment purchases and funds managed for other commands have been excluded, as previously discussed. Theses rates are calculated here separate from the external costs presented below, because these items represent the 'real' fund use and transactions which occurred at SIMA San Diego. The rates calculated in subsequent sections represent funds and transactions which would have occurred had SIMA been a member of DBOF during FY 95.

Table 12 summarizes the indirect and general and administrative (G&A) costs incurred by SIMA San Diego during FY 95. These amounts were taken from the corresponding categories in Table 10 above. All allocation rates calculated use the total earned hours of 913,657 as the allocation base. The total indirect expenses of

$37,563,893 provide an allocation rate of $41.114 per direct labor hour for indirect costs. Total G&A expenses of $ 4,724,937 provide an allocation rate for G&A expenses of $ 5.171 per direct labor hour.

FUND	INDIRECT AMOUNT	G&A AMOUNT
SUPPLY AND EQUIPAGE	$ 3,995,543	$ 645,421
REPAIR OTHER VESSEL (PRIMARY)	$ 4,611,564	$ 0
REPAIR OTHER VESSEL (SECONDARY)	$ 0	$ 0
TAD/TAR	$ 97,259	$ 44,584
OTHER	$ 202,917	$ 0
MILITARY LABOR	$ 25,308,316	$ 3,151,176
CIVILIAN LABOR	$ 3,348,294	$ 883,756
TOTAL	$ 37,563,893	$ 4,724,937

Table 12. Indirect and General and Administrative Expenses

D. DEPRECIATION

Department of Defense FMR (DoD INST 7000.14-R, Volume 11B, Chapter 58, p. 58-8) requires DBOF activities to depreciate equipment over set periods (20 years for plant property, ten years for non-ADP equipment, and five years for ADP equipment) using acquisition, installation and upgrade/improvement costs. SIMAs do not charge or record depreciation expense for equipment. They do, however, track the acquisition date and acquisition cost, which can be used to develop an approximation of the FY 95 depreciation expense. The acquisition costs recorded by SIMA do not include installation costs but do include upgrade costs, which are discussed below. Depreciation for plant property is also discussed below.

The assumption required to estimate depreciation expense is one of averaging or smoothing of upgrade/overhaul costs which improve or increase the useful lives of depreciable equipment. Currently SIMA San Diego does capitalize the costs associated with equipment upgrades and maintenance designed to increase the useful life of equipment. This is completed by altering the acquisition price in its records and notifying the DFAS OPLOC of the change. No change is made in the useful life of the equipment. The only record of the date this occurred is the transaction to expend the funds necessary for the alteration. Determining this date would require reviewing all OPTAR transactions back to the date of the oldest equipment acquisition date recorded. Therefore, it is assumed the potential aggregate lost depreciation expense for equipment purchased prior to FY 86 is offset by the higher aggregate depreciation expense for capital improvements to equipment acquired FY 86 or later.

For example, if a piece of equipment where acquired in 1982 for $75,000 and in 1987 received an upgrade costing $25,000, the acquisition price would be listed as $100,000 with an acquisition date of 1982.[20] In FY 95 there would not be a depreciation expense associated with this equipment because 1991 would be the last year of the ten year depreciation life. However, if, when the upgrade were performed, there was an adjustment to the useful life of the equipment, there could have been a depreciation expense of as much as $6,250[21] in FY 95. In contrast, suppose

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[20]For simplicity, all transactions are assumed to happen at the beginning of the fiscal year.

[21]The 1987 book value of the equipment would be $37,500 ($75,000/10 years is $7,500 leading to depreciation expense for 1982 through 1986 of $37,500). Conceptually, the $25,000 upgrade in 1987 could lead to an additional ten year service life. The book value immediately after the upgrade of $62,500 ($37,500+$25,000) would provide a depreciation expense of $6,250 for each of the next ten years.

equipment was purchased in 1986 for $75,000 and upgraded in 1994 for $25,0000. In this case the acquisition cost would also be $100,000 and in 1995 depreciation expense for this equipment would be $10,000. If on the transaction date it was determined the upgrade provided an additional ten years service life, the actual depreciation expense for FY 95 could be as little as $4,000.[22] In this example, if the useful lives were not updated at the time of upgrading, depreciation expense would be $10,000. If, however, the useful lives were updated at the time of the improvement, depreciation expense could also be $10,250 ($6,250 for the first equipment and $4,250 for the second). The assumption is that, over all depreciable equipment, the total of these small potential differences is negligible.

Depreciation of plant property is allowed for facilities constructed for less than the $300,000 minor construction limit. Facilities constructed through funds provided by the Military Construction (MILCON) appropriation are not depreciable for DBOF activities. SIMA San Diego is currently limited by CNSP direction in the amount of funds expended for minor construction to 7.5 percent of its facilities budget, which for FY 95 was $828,389. This limited SIMA to a maximum minor construction expenditure of approximately $62,130. The FY 95 facilities budget is consistent with past fiscal years' facilities budgets. SIMA made minor construction expenditures of $0 in FY 95, $43,000 in FY 94, $15,000 in FY 93 and $37,000 in FY 92. Minor construction records for years prior to FY 92 were not available. All expenditures

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[22]The 1994 book value of the equipment would be $15,000 ($75,000/10 years is $7,500 leading to depreciation expense for 1986 through 1993 of $60,000). Conceptually, the $25,000 upgrade in 1994 could lead to an additional ten year service life. The book value immediately after the upgrade of $40,000 ($15,000+$25,000) would provide a depreciation expense of $4,000 for each of the next ten years.

were made in the construction/acquisition of modular offices. Because the limitation SIMA San Diego has on its minor construction funds and the known expenditures are all under the capitalization and depreciation level of $50,000, it is assumed that the minor construction expenditures for FY 76 through FY 91 are all below the capitalization and depreciation threshold. Even if some years' expenditures were significantly above this threshold there would not be a significant impact on the manday rate. A single year in which SIMA San Diego may have spent the current maximum of $300,000 would increase depreciation expense by $15,000 when depreciated over 20 years.

The depreciation method used is the straight line method using 10 years for non-ADP and 5 years for ADP equipment useful lives. No residual value is used in the calculations. DoD FMR (DoD INST 7000.14-R, Volume 11B, Chapter 58, p. 58-7) requires use of a residual value when calculating depreciation expense if the estimated residual value is 10 percent or more of the acquisition cost. SIMA does not, as previously stated, depreciate equipment and, therefore, has not estimated residual values of equipment. Additionally, when SIMA does dispose of equipment it is simply a transfer of custody responsibility. The gaining command is responsible for estimating the value of the transferred equipment if any estimation is required, so no previous historical data is available. Any significant residual value would not significantly reduce the manday rate when spread over the depreciable life of the asset. Table 13 presents the depreciable equipment and the FY 95 depreciation charges. An allocation rate of $ 0.608 for depreciation expense per direct labor hour is used in this study.

There were some discrepancies in the identification of depreciable equipment. NAVSEA had records indicating equipment was provided to SIMA in FY 93 at a value of $64,124 and in FY 94 at a value of $54,225. SIMA San Diego does not have

DEPRECIATION SCHEDULE					
SHOP	ITEM	ACQUISITION COST	TYPE (ADP OR NON-ADP)	ACQUISITION YEAR	FY95 DEPRECIATION
31A	BORING/MILLING MACHINE	$ 246,000	NON	86	$ 24,600.0
81A	FURNACE, MELTING	$ 157,000	NON	86	$ 15,700.0
31A	MILLING MACHINE	$ 342,000	NON	87	$ 34,200.0
31A	MILLING MACHINE	$ 130,000	NON	88	$ 13,000.0
31A	LATHE, CNC	$ 296,560	NON	88	$ 29,656.0
31A	LATHE, ENGINE L-24	$ 87,007	NON	89	$ 8,700.7
31A	BORING/MILL, HORIZONTAL	$ 55,300	NON	89	$ 5,530.0
31A	LATHE, ENGINE	$ 260,614	NON	89	$ 26,061.4
31D	LATHE, ENGINE	$ 67,397	NON	90	$ 6,739.7
31H	TRAVERSE WINCH	$ 77,000	NON	90	$ 7,700.0
31H	TEST RIG, 30 HP	$ 120,550	NON	90	$ 12,055.0
31H	TEST RIG, 100 HP	$ 134,122	NON	90	$ 13,412.2
31H	TEST RIG, STATIC	$ 129,654	NON	90	$ 12,965.4
31A	LATHE, ENGINE	$ 79,016	NON	90	$ 7,901.6
31A	LATHE, ENGINE	$ 144,976	NON	91	$ 14,497.6
31A	LATHE, ENGINE	$ 144,976	NON	91	$ 14,497.6
31A	LATHE, ENGINE	$ 144,976	NON	91	$ 14,497.6
31A	GRINDER	$ 65,000	NON	91	$ 6,500.0
71B	AIR COMPRESSOR, ROTARY	$ 54,712	NON	91	$ 5,471.2
71B	BLAST ROOM ASSEMBLY	$ 51,500	NON	91	$ 5,150.0
71B	BLAST ROOM ASSEMBLY	$ 51,500	NON	91	$ 5,150.0
S46	COMPUTER	$ 135,674	ADP	91	$ 27,134.8
S46	COMPUTER	$ 146,319	ADP	91	$ 29,263.8
S46	COMPUTER	$ 97,191	ADP	91	$ 19,438.2
95A	SPECTROMETER	$ 71,321	NON	91	$ 7,132.1
31E	STAND, TEST, DIESEL FUEL PUMP	$ 216,936	NON	91	$ 21,693.6
35A	COLLINATOR	$ 57,500	NON	91	$ 5,750.0
31A	LATHE, ENGINE, CNC	$ 159,160	NON	92	$ 15,916.0
31A	GRINDING MACHINE, CYLINDRICAL	$ 134,727	NON	92	$ 13,472.7
31A	BORING/MILLING MACH	$ 80,238	NON	92	$ 8,023.8
11A	SHEARING MACHINE	$ 58,722	NON	92	$ 5,872.2
T01	POST PRODUCTION SUITE (TRAINING)	$ 80,000	NON	93	$ 8,000.0
93B	FURNITURE, 31 WORKSTA, 275 PCS	$ 59,489	NON	93	$ 5,948.9
31A	WATER JET, HIGH PRESSURE	$ 67,272	NON	93	$ 6,727.2
95B	SPECTROMETER, ICAP 61	$ 148,333	NON	93	$ 14,833.3
95B	SPECTROMETER, ATOM SCAN 25	$ 76,486	NON	93	$ 7,648.6
95B	KEVEX ANALYZER	$ 54,700	NON	93	$ 5,470.0
31A	MILLING MACHINE	$ 54,132	NON	94	$ 5,413.2
64A	LATHE, WOODWORKING	$ 90,370	NON	94	$ 9,037.0
31A	LATHE, CNC	$ 144,221	NON	95	$ 14,422.1
31A	MILLING MACHINE	$ 69,180	NON	95	$ 6,918.0
71B	OVEN, BURN OFF	$ 87,157	NON	95	$ 8,715.7
56A	PIPE BENDER	$ 245,680	NON	95	$ 24,568.0
		$ 5,174,668			$ 555,385.2

Table 13. Depreciation Schedule

items for these values and those acquisition years in its equipment records. Additionally, both NAVSEA and CNSP personnel believe two or three computer mainframe systems costing $70,000 to $80,000 each were provided to SIMA San Diego in FY 93. No records of this transaction were found either at NAVSEA or SIMA San Diego. These items are excluded from this study and SIMA San Diego's equipment records are considered to be the governing documents. If the items discussed above were included, the depreciation allocation would increase to $0.654 per direct labor hour (with the manday rate increasing by $0.343 per direct manday) because depreciation expense would increase to approximately $597,220.

E. BASE SUPPORT COST ALLOCATION

The arbitrary nature of allocating common costs among users of services brings into question the fairness of allocations. What appears fair to one user may not appear fair to other users. The issues include the basis for allocation (value, number of users, square footage, etc.) and the method of allocation (direct, step, reciprocal, etc.). Careful consideration must be made in determining the basis and methods for allocating costs with an emphasis on ensuring that a cause and effect relationship exists between the costs and the allocation base. In this study the reciprocal method is used to allocate base support costs among the various providers of support and the direct method is used to allocate the costs of the services to SIMA San Diego. Budget Exhibit Fund-22 from DoD FMR (DoD INST 7000.14-R, Volume 2B, Chapter 9, pp. 9-110) provides a summary of base support items which should be reimbursed by the NSY to the providing activity. The sections below identify which costs were captured, how they were identified and the reasons for items which were not included. Additionally, rates for the items requiring allocation are calculated in the appropriate sections.

1. Costs Included in Manday Rate Calculations

Costs included in the manday rate calculations were captured in three different ways: SIMA San Diego currently provides reimbursement; some are included in the labor costs used; and some costs were collected and allocated through this study. Table 14 provides a summary of the costs which were included and the way in which they were captured. Some items, such as ADP/Automation Services and Legal Services, appear in more than one category. This is due to the varying levels of service provided in different ways.

ITEMS CAPTURED IN THIS STUDY		
ITEMS FOR WHICH SIMA SAN DIEGO REGULARLY REIMBURSES FROM ITS CURRENT OPERATING BUDGET	ITEMS FOR WHICH REIMBURSEMENT IS CONSIDERED TO BE CONTAINED IN THE LABOR COSTS	ITEMS ALLOCATED AS PART OF THIS STUDY
•ADMINISTRATIVE SERVICES •AUDIO/VISUAL SERVICES •ADP/AUTOMATION SERVICES •CUSTODIAL SERVICES •DISASTER PREPAREDNESS •ENGINEERING SUPPORT •ENVIRONMENTAL COMPLIANCE •EQUIPMENT OPERATION, MAINTENANCE, & REPAIR •FACILITIES AND REAL PROPERTY SUPPORT •FACILITY MAINTENANCE AND REPAIR •FINANCE AND ACCOUNTING •LEGAL SERVICES •MOBILIZATION SUPPORT •PRINTING AND REPRODUCTION •PURCHASING AND CONTRACTING SERVICES •REFUSE COLLECTION & DISPOSAL •RESOURCE MANAGEMENT •SAFETY •TRAINING SERVICES •TRANSPORTATION SERVICES •UTILITIES	•CHAPEL & CHAPLAIN SERVICES •COMMUNITY SUPPORT SERVICES •EDUCATION SERVICES •FOOD SERVICES •HEALTH SERVICES •HOUSING & LODGING SERVICES •LEGAL SERVICES •LIBRARIES •MORALE & FITNESS SUPPORT	•ADP/AUTOMATION SERVICES •INFORMATION SERVICES •FIRE PROTECTION •MILITARY PERSONNEL SUPPORT •POLICE SERVICES

Table 14. Support Costs Included in the Calculation of Manday Rates

a. Items for which SIMA San Diego Currently Provides Reimbursement

The items in this category are either performed by SIMA San Diego itself or it reimburses other activities for providing the service. The majority of the

purchased services are provided by the Public Works Center (PWC) for the Naval Station. PWC charges SIMA for utilities, refuse collection and some environmental compliance costs. The remainder of the items are those for which SIMA maintains the capability to perform or performs as part of its mission (i.e., mobilization support) and are captured in its operating budget and/or labor costs.

b. Items Included in Labor Costs

The items in this section are considered to already be charged to SIMA because of the military labor rates used in the study. The Composite Standard Military Rates are the fully burdened rates which include all pay and benefits from being a service member. These benefits include the advantages military personnel receive through either free (i.e., health services) or discounted (i.e., retail stores) services. Because these categories are already included in the labor costs it is not necessary, nor correct, to allocate additional costs to SIMA. Legal services are included in both this category and in the category above. They are included above, in categories already paid for, because SIMA maintains a legal service division. They are also included here because military personnel also have access to Navy Legal Services outside the SIMA organization.

c. Items Allocated as Part of this Study

The major base support costs not captured in the labor costs or operating budget were identified and allocated as part of this study. As previously stated, the reciprocal method is used to allocate costs between the service providers (Fire Department, Security Department and Personnel Support Detachment (PSD)) and the direct method is used to allocate these costs to SIMA. For allocating fire and security services the square footage of the activities were used. The allocation of personnel services was made based on the number of personnel serviced. While these may not be the best allocation bases, they are the ones for which information is readily

available. A more correct allocation of fire protection would take into account the nature of the work performed (industrial versus administrative) and any fixed fire protection in the activities in question. Security services, as well as fire protection, could also be allocated based on the values of the activities' assets being protected. This information was considered too difficult to obtain and, for the purposes of this study, would not provide significantly better allocations. The ADP/Automation Services and the Information Services were allocated as part of NAVSEA operating costs for the MRMS system. These items have already been included in the costs for operating SIMA (Other Funds in Table 10).

The costs captured for the three services are not in accordance with DoD FMR requirements. The costs for the services included civilian labor costs (as calculated and accelerated by each of the activities), the operating budget for the year (including equipment purchases and minor construction costs) and military labor (added by the researcher in this study). Actual FY 95 costs are used for security and personnel services. The costs used for fire protection are budgeted FY 96 amounts. This difference is not considered significant in this study as there are not significant changes in the operating expenses between the different years. For generalization purposes, any mention of FY 95 costs in this section also refer to FY 96 fire protection costs. There were no equipment depreciation expenses or external items (excluding those service costs allocated in this study) captured. It is assumed the equipment purchases and minor construction projects for FY 95 would approximate the depreciation expense for FY 95 and there is not a significant difference. There would be very little impact on the SIMA manday rate, even with a significant difference in equipment purchases and depreciation expense, because of the large base over which this difference would be allocated. Military labor expenses were calculated using the Standard Composite Military Pay and authorized billets. Civilian

labor expenses were included in the operating budget at the amounts which the individual service providers used for FY 95. Future personnel support costs may increase slightly due to the introduction of the new military identification cards. During FY 95 all identification cards were provided to PSD at no cost. Expected annual costs for identification cards in future years is approximately $25,000. This will not significantly alter any allocated PSD costs.

Tables 15, 16 and 17 provide the FY 95 service allocations to SIMA San Diego for the Security Department, Fire Department and Personnel Support Detachment, respectively. Table 18 presents the rates calculated for allocation per DLH and direct manday at SIMA. A total of $2,489,115 was allocated to SIMA for these services. As mentioned above, the Total Earned Manhours of 913,657 are used as the allocation base. As can be seen by the relatively low per manday rates for the individual services, significant differences from the assumptions made in collecting the FY 95 costs would have little impact on the SIMA San Diego manday rate.

2. Items Not Included in Manday Rate Calculations

In this study several base support items have not been included. These items are summarized in Table 19. The reasons for excluding these items are discussed in the sections below. In the opinion of the researcher, the inclusion of all of these items in the study would not significantly increase the manday rate calculated as most of the items are considered insignificant when compared with the total operating costs for SIMA San Diego.

SECURITY DEPARTMENT	
FY 95 OPERATING COSTS	$ 5,690,239
MILITARY LABOR	$ 4,284,364
FIRE PROTECTION	$ 8,598.11
PSD SERVICES	$ 84,904.94
TOTAL	$ 10,068,106
REIMBURSABLES RECEIVED FROM OTHER COMMANDS (BASED ON SQ FT)	$ (1,305,085)
TOTAL AVAILABLE FOR ALLOCATION	$ 8,763,021
SQUARE FEET	4,775,065
ALLOCATION RATE PER SQUARE FOOT	$ 1.835
SIMA ALLOCATION (525,625 SQ FT)	$ 964,607

Table 15. Security Department

FIRE DEPARTMENT	
FY 96 OPERATING COSTS	$ 18,462,000
COST/COMPANY (26 CO'S)	$ 710,077
32ND STREET COST (3 CO'S)	$ 2,130,231
SECURITY	33,677.75
TOTAL	2,163,909
REIMBURSABLES RECEIVED FROM OTHER COMMANDS	$ -
TOTAL AVAILABLE FOR ALLOCATION	$ 2,163,909
SQUARE FEET	$ 4,775,065
ALLOCATION RATE PER SQUARE FOOT	$ 0.453
SIMA ALLOCATION (525,625 SQ FT)	$ 238,197

Table 16. Fire Department

PERSONNEL SUPPORT DETACHMENT	
FY 95 OPERATING COSTS	$ 1,602,183
MILITARY LABOR	$ 3,520,902
FIRE PROTECTION	$ 69,405
SECURITY	$ 17,141
TOTAL	$ 5,209,632
REIMBURSABLES RECEIVED FROM OTHER COMMANDS	$ -
TOTAL AVAILABLE FOR ALLOCATION	$ 5,209,632
NUMBER OF PERSONNEL SERVICED	7,363
ALLOCATION RATE PER SERVICE MEMBER	$ 707.542
SIMA ALLOCATION (1818 BILLETS AUTHORIZED)	$ 1,286,311

Table 17. Personnel Support Department

	PER DIEM	PER DIRECT MANDAY
SECURITY ALLOCATION RATE	$ 1.056	$ 7.918
FIRE ALLOCATION RATE	$ 0.261	$ 1.955
PSD ALLOCATION RATE	$ 1.408	$ 10.559
TOTAL ALLOCATION RATE	$ 2.724	$ 20.433

Table 18. Allocation Rates

ITEMS NOT ACCOUNTED FOR IN THIS STUDY	
CONSIDERED UNIDENTIFIABLE OR INSIGNIFICANT	NOT REQUIRED OR NOT DONE IN PRACTICE
•CONFINEMENT & DETENTION CENTERS •COMMON USE FACILITY OPERATION, MAINTENANCE, REPAIR & CONSTRUCTION •COMMAND ELEMENT •CIVILIAN PERSONNEL SERVICES •SHUTTLE SERVICES	•COMMUNICATION SERVICES •CLUBS •INSTALLATION RETAIL SUPPLY & STORAGE OPERATION •EXPLOSIVE ORDNANCE •LAUNDRY & DRY CLEANING •MORTUARY SERVICES •WEATHER SERVICES

Table 19. Support Costs Not Included in the Manday Rate Calculations

a. Items Considered Insignificant and/or Unidentifiable

The items contained in this category are those items which could either not be identified or estimated or were considered so insignificant in amount as to not warrant the effort to identify. For example, initial cost estimations (excluding military labor and allocation of other support services) for the Shuttle Service operated at the 32nd Street Naval Station provided an allocation rate of approximately $0.50 per person annually. This would amount to approximately $1,000 in costs to SIMA San Diego for FY 95. Additionally, there is one consolidated brig which serves all of the San Diego area (approximately 100,000 naval personnel). SIMA San Diego's share of these operating costs are considered insignificant. The costs for common use facilities are also considered insignificant and, in some cases, not identifiable. The facilities used by the LB Det are part of the LBNSY, which does not require SIMA San Diego to provide reimbursement other than for utilities. If it is not significant enough for a current DBOF activity to require reimbursement, it is assumed not to be significant enough to calculate the costs SIMA would pay if it were also in DBOF. Additionally, SIMA provides some office space for CNSP personnel and space for their computer systems as well as an office for the base chaplain. Reimbursement for these items are considered insignificant. Reimbursement for utilities is considered insignificant and not identifiable. The utility costs for the building in which the office space is provided is known, but the actual usage of these utilities for the specific office space is not distinguishable from the total. SIMA San Diego's share of its command element is considered unidentifiable and insignificant. Additional discussion of this is provided in the section on Management Headquarters Costs below. Civilian Personnel Services are also considered insignificant for the same reasons as the LBNSY common use facilities. PWC provides the payroll and administrative record services for the 103 SIMA civilian employees on a non-reimbursable basis.

PWC's, in general, operate on a cost recovery basis and charge their customers for services performed. Because PWC does not attempt to recover costs for these services from SIMA, they are considered insignificant. In summary, all of the items in this category would increase the manday rate calculated, but not materially, and are considered to be insignificant factors.

b. Items Which Do Not Require Allocation of Costs or Which Are Not Normally Allocated in Practice

This category includes items which SIMA San Diego does not use, are self-funded by charges to customers, or are not normally reimbursed in practice. The items which SIMA San Diego does not use are Weather Services, Mortuary Services, Explosive Ordnance and Laundry and Dry Cleaning. Clubs and Installation Retail Supply & Storage Operations operate in such a way as to provide their own funds (charge their customers for services used) and do not require reimbursements from other activities. Communications Services (other than telephones which are currently paid for) are not normally reimbursed by NSYs. That is, NSYs pay for telephone services but they do not reimburse the Naval Computer and Telecommunications Command for naval messages sent and received.

F. MANAGEMENT HEADQUARTERS COSTS

Department of Defense FMR (DoD INST 7000.14-R, Volume 11B, Chapter 62, p. 62-13) requires DBOF activities to pay or reimburse the costs related to DBOF specific management activities at headquarters. That is, DBOF activities pay for the costs associated with management of the fund at the headquarters level and below. These costs are allocated to the DBOF activities based on the size (budget) of the activity. There are currently no DBOF management positions in SIMA San Diego's chain of command from which these costs would be allocated. It is possible to determine the total headquarters management costs allocated to NSYs in FY 95 and

the base for this allocation and, from this, determine what SIMA San Diego's share of management costs would have been. LBNSY was allocated $756,074 for management costs in FY 95 based on the number of budgeted mandays of 452,631. Based on this, the allocation is $1.670 per direct manday. SIMA San Diego had 121,821 direct mandays (based on earned manhours) for FY 95, which would lead to a headquarters charge of $203,490. This number would be overstated because it would only include one IMA in the base where, if IMAs were to be included in DBOF, there would be a much larger base over which to allocate these costs (assuming the inclusion of IMAs does not significantly increase the costs of management). This allocation of headquarters costs would increase SIMA San Diego's manday rate by $1.67, which is not considered significant.

Alternatively, one could estimate the costs of personnel in the current chain of command which might be involved in DBOF management if the current chain of command were to add these responsibilities. This approach leaves room for many assumptions and variations in the determination of the amount of time (say, in manyears) and the level of personnel (GS-13, GS-15, or O-4, O-6) necessary at each of the command layers (ERSG, CNSP, CPF).

DoD FMR (DoD INST 7000.14-R, Volume 11B, Chapter 62, p. 62-13) makes a distinction regarding the significance of management headquarters costs. In order to be significant and require reimbursement or payment, management headquarters costs must exceed 1 percent of the total business area costs or $1 million, whichever is greater. For the purposes of this study, it is assumed the management headquarters costs would be insignificant and, therefore, not be allocated to SIMA San Diego.

G. PRODUCTION HOURS (DIRECT LABOR HOURS)

Until FY 96 Naval shipyards included in their DLH budgeting estimations first and second line supervisor hours. These "direct" supervisory hours are based on

estimates of the hours which will be identifiable to a specific job. Supervisors hours other than these are considered indirect support overhead. The MRM System used by SIMA tracks earned and expended production hours by job and does not track support hours by job. As previously stated, all supervisors' time is considered support hours in the MRMS data base. In order to provide a manday rate which is comparable between the two types of organizations, the manday rate for NSYs' will be recalculated by backing out the supervisors' direct hours.[23] This is accomplished by using the estimated number of supervisors' direct hours included in the total direct mandays used for calculating the composite manday rates. Table 20 presents the manday rates for NSYs adjusted for the exclusion of supervisor direct labor hours. Additionally, the calculations presented in Table 20 remove the DBOF surcharge, which includes recovery factors for past operating years and costs associated with the Joint Logistics Systems Command (JLSC). This surcharge is removed from the NSY

[23]A recent Naval Audit Service (NAS) study comparing DBOF and direct funded activities estimated the DLHs of supervisors at the direct funded activity by multiplying the hours available by the productivity ratio of production personnel (phone interview with Mr. Glenn Eberling of the NAS 22FEB96). While this also levels the playing field and allows direct comparison, it is unlikely that a supervisor provides as many DLHs as a production worker. Using the estimates of shipyard supervisor direct hours to alter the manday rate seems more appropriate because the supervisors' DLHs estimates are based on past performance. It is acknowledged the goals of the NAS study were different than the goals of this study and therefore different assumptions and methodologies are to be expected. This is not a criticism of the methodology used by NAS.

	TOTAL DIRECT MANDAYS FY95	ESTIMATED % OF SUPERVISOR TIME INCLUDED	DIRECT MANDAYS EXCLUDING SUPERVISOR TIME	TOTAL FY 95 COMPOSITE MANDAY RATE	DBOF COMPOSITE SURCHARGE	COST RECOVERY RATE	COSTS TO RECOVER	COMPOSITE MANDAY RATE ADJUSTED FOR EXCLUSION OF SUPERVISOR TIME
PORTSMOUTH NSY	660,319	9.40	598,249	$ 564.80	$ (129.46)	$ 435.34	$ 287,463,273.46	$ 480.51
NORFOLK NSY	837,355	8.25	768,273	$ 611.65	$ (146.81)	$ 464.84	$ 389,236,098.20	$ 506.64
LONG BEACH NSY	452,631	4.43	432,579	$ 539.91	$ (53.48)	$ 486.43	$ 220,173,297.33	$ 508.98
PUGET SOUND NSY	1,754,450	10.50	1,570,233	$ 515.28	$ (149.38)	$ 365.90	$ 641,953,255.00	$ 408.83
PEARL HARBOR NSY	487,480	9.50	441,169	$ 774.76	$ (175.83)	$ 598.93	$ 291,966,396.40	$ 661.80

Table 20. NSY Manday Rates

manday rate in order to produce a manday rate which is most directly comparable to the SIMA manday rate calculated.

H. CARRY-IN/CARRY-OVER

Carry-in and carry-over are the workload carried over between fiscal years. Carry-in is the number of DLHs remaining on work started in the previous fiscal year (e.g., 1995) while carry-over is the estimated DLHs remaining on work started in the current fiscal year (e.g., 1996) to be completed in the next fiscal year (e.g., 1997). One year's DLH carry-over is the following year's DLH carry-in. DBOF activities identify and track these to be used during the rate setting process. Carry-in is subtracted from budgeted DLHs and costs because it is already financed. Carry-over workload has the rate for the fiscal year in which the work was accepted/started (e.g., 1996) multiplied by an inflation factor and then added to the budget year's (e.g., 1997) total costs. The data collected from SIMA San Diego does not identify these items and they are not used in calculating the FY 95 SIMA manday rate.

I. ACTIVITY BASED COSTING

One of the objectives of this study was to provide a data base to which activity based costing could be applied. Unfortunately the nature of operations at a mission funded activity does not provide incentives for that organization to collect and store the information required in the format required. This is as much due to unavailability of the information as it is the lack of need for the information. For example, electricity usage is, at most, tracked by building. This does not provide enough information to allocate electrical usage accurately to the shops within the building. Some shops, like the Lagging Shop, use electricity for little more than overhead lighting while other shops, which could be in the same building, use electricity for numerous pieces of equipment. A fair allocation of electricity cannot be made without more detailed information regarding the users of the electricity. Another

example of the lack of detail available is the dollar amounts spent for repair parts. The total amount spent during FY 95 is easily obtainable, but how much each shop spent is not available. If activity based costing were to be used to allocate the Supply Department's costs incurred in the ordering and management of repair parts, a basis of allocation might be the dollar value of the parts ordered or the number of parts ordered for the year. This data was not available to the researcher. Because the main focus of this study was to determine the manday rate for SIMA San Diego under DBOF regulations and the amount of time necessary to develop estimates for items such as these, the researcher did not pursue this avenue. (For example, the researcher could have attempted to determine the electrical equipment each shop used and, from technical manuals for the equipment, determined the electrical usage for each piece of equipment. This would have provided a basis for the allocation of electricity to individual shops on a basis other than the DLH. This was considered a large amount of effort to reallocate $631,624 in electricity costs, which is only $5.21 per manday as currently allocated. A similar example can be seen in hazardous waste disposal. The efforts required to determine a more fair and accurate allocation of the $343,077 (approximately $2.84 per manday) expended is not justified by any significant change in individual shop manday rates.)

One of the secondary research questions was to determine the feasibility of using ABC at a SIMA. As discussed above, SIMA San Diego does not, nor is it required to, record the information necessary to use ABC. Additionally, the implementation of ABC would require a large effort, and possible expense, in order to determine the basis over which allocations could be made. As discussed above, electricity usage could be estimated through determing the amount of electricity each piece of equipment uses. Alternatively, meters could be installed, at an expense, which could provide accurate electricity usage for each shop. Additional examples

of this type are steam, water and natural gas usage. Excluding purely managerial and cost control reasons, the implementation of ABC might be justified for the following reasons: 1) If SIMAs were to enter DBOF and charge different manday rates for each shop's work;[24] or 2) In order to provide more precise manday rates for use in comparison with other activities' manday rates which were also calculated using ABC methods. Unless ABC were implemented for these reasons, it does not appear the benefits gained would be justified by the efforts required. This is especially true if the main interest lies in the computation of a composite manday rate, which would not be immediately affected by any differences resulting from the application of ABC.[25]

J. SUMMARY OF FACTORS WHICH MAY AFFECT THE CALCULATED MANDAY RATE

This section provides a summary of the assumptions, and their potential impacts, which might affect the calculated manday rate. Table 21 presents these items and the estimated dollar amount of the impact, if any. The items which could most significantly affect the manday rate are the costs of reservists and the personnel

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[24]NSYs currently charge different manday rates for different types of work (refit, repairs, alterations, etc.) based mostly on the different amounts of planning required for each type of work. NSYs do not charge different rates for each production shop area.

[25]The managerial and cost control benefits potentially provided from the implementation of ABC could influence future manday rates. The true costs of performing different types of maintenance and the drivers of those costs would be seen, thus providing the information and incentives to more effectively control the costs associated with these actions. This information could be especially useful in determining which types of maintenance capabilities the Navy wished to maintain or eliminate. ABC could provide more accurate costs of performing specific types of maintenance which could be compared to the costs of acquiring equivalent services from other sources. For those types of maintenance that are readily available at a lower cost from other sources, the Navy could consider eliminating that capability from IMAs.

FACTOR	AFFECT ON MANDAY RATE	ESTIMATED AMOUNT
CIVILIAN VS. MILITARY LABOR	DECREASE	UNKNOWN
RESERVISTS	INCREASE	$ 23.91
MANNING LEVELS	INCREASE	$ 69.09
OBLIGATION VS. EXPENDITURES	DECREASE	UNKNOWN
DIRECT COST ITEMS	INCREASE	$ 4.05
BASE SUPPORT ITEMS NOT CAPTURED	INCREASE	UNKNOWN
HEADQUARTERS COSTS	INCREASE	$ 1.67
APPROXIMATE NET EFFECT		$98.72

Table 21. Factors Affecting Manday Rate Calculation

in excess of the authorized manning, which together would increase the manday rate by $93.00. The rest of the items listed in Table 21 which have an estimated dollar amount could increase the manday rate by only $5.72. The items charged directly to the customer (excluding repair parts) could, at most, cause a $4.05 increase in the manday rate if all items were to be included in overhead. Headquarters costs could, if included, increase the manday rate by $1.67. The base support items which were not captured (confinement services, costs associated with common use facilities, command element costs, civilian personnel services and shuttle services) are assumed to have an insignificant affect.

IV. ANALYSIS AND CONCLUSIONS

Ordinarily the assumption would be made that the year under study is typical of past and future years, in order to ensure that an accurate analysis is made and to provide predictive value for future years. Unfortunately, FY 1995 was not a typical year for SIMA San Diego and is not likely to be indicative of future years. Manning levels and operating budgets were consistent with previous years and are expected to remain similar in the near future. However, the workload changes which occurred in FY 95 were significant and are expected to continue changing. Due to the decommissioning of all destroyer tenders in the San Diego area and other factors, SIMA San Diego's workload increased by 17 percent over previous levels. Additional increases in workload are expected due to recent cancellations of CNO-funded ship availabilities. Fortunately, this has little impact on the calculation of a manday rate for SIMA and will still allow predictions of future manday rates. This is possible because the majority of costs included in the calculation of the manday rate are fixed. The largest portion of costs incurred are labor costs which, for an activity manned mostly by military personnel, is almost constant from year to year (SIMA San Diego's authorized enlisted manning will increase from the current 1,788 to 1,790 over the next six years). A NSY varies its manning levels in congruence with the planned workload, which allows the NSY to treat labor costs as variable from period to period. The result of the largely fixed costs of operating SIMA is the ability to predict future manday rates based on estimates of changes in workload and changes in operating costs which are not a result of workload changes. These changes in the largely fixed operating costs would be a result of price level changes and changes in the operating budgets received from higher commands. The impact on this study of the inability to assume FY 95 was a typical year lies mainly in predicting total operating costs.

Items such as repair parts and materials are driven by the workload and will grow as workload grows. These items, however, are not included in the calculation of the manday rate because they are considered costs charged directly to the customer, in addition to the manday rate. In effect, the total operating costs for SIMA San Diego will grow as its workload grows, but the costs used in the calculation of manday rates, which are a subset of the total operating costs, will remain steady and therefore allow prediction of future manday rates. Many of these issues are discussed in detail below.

A. TOTAL IMA OPERATING COSTS

The total cost to the Navy for operating SIMA San Diego in FY 95 was $116,288,974. This includes all funds presented in Table 10 with the exception of the funds managed for other commands. Base support costs (fire, security and personnel) are not included in this total because the goal is to identify the direct operating costs for SIMA San Diego. An additional $2,489,115 would be added to the figure above if these costs were to be included. The operating costs can be broken down into several different accounts and types of costs. Table 22 presents the different accounts and the amounts placed into direct, indirect and general and administrative categories in this study. Table 23 shows the breakdown of the variable and fixed costs, as determined by the researcher.

	INDIRECT	G&A	DIRECT	EQUIPMENT	TOTAL
SUPPLY & EQUIPAGE	$ 3,995,543	$ 645,421	$ 31,847	$ -	$ 4,672,811
ROV(P)	$ 4,611,564	$ -	$ 27,512,666	$ -	$ 32,124,230
ROV(S)	$ -	$ -	$ 4,167,129	$ -	$ 4,167,129
TAD/TAR	$ 97,259	$ 44,584	$ 142,422	$ -	$ 284,265
OTHER	$ 203,617	$ -	$ -	$ 804,088	$ 1,007,705
MILITARY LABOR	$25,308,316	$ 3,151,176	$ 41,166,787	$ -	$ 69,626,279
CIVILIAN LABOR	$ 3,348,294	$ 883,758	$ 174,503	$ -	$ 4,406,555
TOTAL	$37,564,593	$ 4,724,939	$ 73,195,354	$ 804,088	$116,288,974

Table 22. Fund Categorization

	FIXED	VARIABLE	TOTAL
SUPPLY & EQUIPAGE	$ 3,903,776	$ 769,035	$ 4,672,811
ROV(P)	$ 36,038	$32,088,192	$ 32,124,230
ROV(S)	$ -	$ 4,167,129	$ 4,167,129
TAD/TAR	$ 169,817	$ 114,448	$ 284,265
OTHER	$ 175,862	$ 831,843	$ 1,007,705
MILITARY LABOR	$69,626,279	$ -	$ 71,619,809
CIVILIAN LABOR	$ 2,413,025	$ 1,993,530	$ 4,406,555
TOTAL	$76,324,797	$39,964,177	$116,288,974

Table 23. Fixed and Variable Costs

A generalization of the differentiation between fixed and variable costs can be made as follows: fixed costs are those associated with maintaining the current capacity while variable costs are those costs associated directly with production efforts, comprised mostly of those direct costs identified in Chapter III. Fixed costs shown in Table 23 are the funds used to operate the support and administrative infrastructure of SIMA and military labor, which has been previously categorized as a fixed cost. Utility costs, which were $1,234,819 for SIMA and $36,038 for the LB Det in FY 95, were considered fixed costs. While it is true that utility usage does vary with production, there is a component of utility usage which would be used even if no production were performed. Because detailed utility usage data is not available and the amount in question is small, relative to total operating costs, the difference between the fixed and variable utility costs is considered negligible. The variable component of civilian labor are those costs associated with civilian labor in production support (work acceptance, planning, QA, etc.). The requirement for this civilian labor would vary directly with the production level of SIMA. The fixed component of civilian labor are the costs of personnel in the supply, facility

maintenance and administrative departments, which would be variable only with large changes in the level of production or capacity.

The majority of the costs associated with the manday rate calculation are fixed costs ($76,324,797), while a rather small portion of the total costs are variable ($3,708,856), when materials and services costs are excluded. The materials and services costs ($36,255,321 in ROV(P) and ROV(S)) would, in theory, be incurred no matter where the maintenance or repairs were performed and, therefore, still be a cost to the Navy, even if SIMA San Diego performed no production. These costs are variable for SIMA, but fixed for the Navy; they are unavoidable costs.[26] The costs to the Navy for operating SIMA San Diego are $76,324,797 if no production is performed and increase only slightly, approximately $3,708,856 or 5%, as production efforts increase.[27] It appears that avoidable costs do not significantly change, even with significant changes in workloads, as long as the current capacity level is not exceeded.

B. SIMA COMPOSITE MANDAY RATE

The FY 95 composite manday rate calculated for SIMA San Diego is $694.64. This manday rate includes all internal and base support costs captured in this study using the allocation rates developed in the previous chapter. These base support rates are summarized in Table 24. Several issues were addressed in Chapter III which

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[26]This assumes all maintenance and repairs performed are necessary and would be completed by an activity other than SIMA San Diego (be it a NSY, a civilian shipyard, another IMA or the ship itself).

[27]SIMA San Diego had average monthly production ratios for FY 95 as follows: Utilization of 58.83; Productivity of 48.67; and Load Ratio of 91.50. Refer to Appendix B for definitions of these items.

OVERHEAD ITEM	ALLOCATION RATE PER DLH
GENERAL & ADMINISTRATIVE	$ 5.171
INDIRECT COSTS	$41.115
DEPRECIATION EXPENSE	$ 0.608
SECURITY DEPARTMENT	$ 1.056
FIRE DEPARTMENT	$ 0.261
PERSONNEL SUPPORT	$ 1.408

Table 24. Allocation Rates

could affect this manday rate. A summary of those items and their potential impacts was provided in Table 21. Table 25, which is continued horizontally across two pages, presents the manday rate calculations for each shop and the composite manday rate.

As can be seen in Table 25, the individual shop manday rates vary from approximately $400 (26Z) to $9,600 (67D).[28] The reason for the large variation in the manday rates is attributed to the fixed labor cost. Excluding labor costs, every shop would have an identical manday rate because the overhead costs are allocated on a DLH basis, which is also the basis for determining the number of mandays. Each shop would have a manday rate of $372.14, which is the sum of the allocation rates in Table 24 converted to a manday rate (multiplied by 7.5 manhours). Small variations in shop manday rates would be expected due to differing costs of labor because of the difference in the rates which compose the shops' manning (for example, one shop might have 10 E-5s and 15 E-6s while another shop might have

[28]The Watch/Clock Repair Shop (35D) and the Typewriter Repair Shop (35E) are excluded from discussion of the manday rates due to their extremely small direct labor contributions. Additionally, 35E has recently been closed.

SHOP		DIRECT BILLETS	TOTAL DIRECT LABOR HOURS	DIRECT MANDAYS	DIRECT LABOR COST	G&A ALLOCATION	INDIRECT ALLOCATION
	ALLOCATION RATE					$ 5.171	$ 41.115
11A	SHIPFITTER SHOP	61	50,640.3	6,752.0	$ 2,184,629.77	$ 261,884.25	$ 2,082,053.41
17A	SHEETMETAL SHOP	30	25,799.9	3,440.0	$ 1,050,987.16	$ 133,423.13	$ 1,060,751.41
26A	WELDING SHOP	12	10,206.2	1,360.8	$ 446,337.89	$ 52,780.95	$ 419,623.37
26Z	WELDING REQUAL SCHOOL	1	5,302.0	706.9	$ 25,967.33	$ 27,419.08	$ 217,989.37
31A	INSIDE MACHINE SHOP	63	45,968.2	6,129.1	$ 2,262,423.63	$ 237,722.68	$ 1,889,962.10
31B	MECHANICAL ENGRAVING	4	2,722.9	363.1	$ 131,981.00	$ 14,081.37	$ 111,950.82
31D	VALVE REPAIR/TEST (1/2 38N)	51	42,079.9	5,610.7	$ 1,869,121.60	$ 217,614.49	$ 1,730,096.37
31E	IC ENGINE SHOP (31C)	43	37,149.4	4,953.3	$ 1,590,242.08	$ 192,116.61	$ 1,527,381.06
31F	HYDRAULIC REPAIR SHOP	11	5,574.0	743.2	$ 436,966.50	$ 28,825.71	$ 229,172.53
31G	PUMP REPAIR (1/2 38N)	54	42,565.8	5,675.4	$ 2,038,324.68	$ 220,127.30	$ 1,750,073.94
31H	ALRE REPAIR	14	22,614.3	3,015.2	$ 530,428.92	$ 116,948.93	$ 929,776.89
31T	GAS TURBINE REPAIRS	20	43,339.6	5,778.6	$ 765,642.37	$ 224,128.98	$ 1,781,888.38
31Z	METAL BUILD UP SHOP	10	7,447.5	993.0	$ 382,964.40	$ 38,514.44	$ 306,200.65
35A	OPTICAL SHOP	6	6,902.6	920.3	$ 213,423.57	$ 35,696.52	$ 283,797.33
35D	WATCH/CLOCK REPAIR	0	0.0	0.0	$ -	$ -	$ -
35E	TYPEWRITER REPAIR	0	1.9	0.3	$ -	$ 9.83	$ 78.12
37A	PRINT SHOP	6	11,393.1	1,519.1	$ 210,610.13	$ 58,918.95	$ 468,422.24
38A	AUXILIARY SHOP	35	29,810.4	3,974.7	$ 1,271,535.79	$ 154,163.27	$ 1,225,641.34
38B	ORDNANCE REPAIR	38	29,408.2	3,921.1	$ 1,515,282.76	$ 152,083.31	$ 1,209,105.06
38Y	ORDNANCE ALTERATION	13	8,754.6	1,167.3	$ 539,585.60	$ 45,274.06	$ 359,941.49
38Z	AIR COMPRESSOR/ALIGNMENT SHOP	11	14,610.5	1,948.1	$ 404,852.64	$ 75,557.61	$ 600,704.21
41A	BOILER REPAIR SHOP	46	40,695.8	5,426.1	$ 1,672,180.50	$ 210,456.68	$ 1,673,189.72
41B	BOILER OUTSIDE REPAIR	14	5,049.4	673.3	$ 530,231.55	$ 26,112.77	$ 207,603.84
51A	INSIDE ELECTRICAL	47	18,665.4	2,488.7	$ 1,721,111.96	$ 96,527.36	$ 767,419.62
51B	OUTSIDE ELECTRICAL	36	22,831.8	3,044.2	$ 1,303,577.14	$ 118,073.73	$ 938,719.30
51G	GYRO/C REPAIR	34	15,448.0	2,059.7	$ 1,248,311.02	$ 79,888.70	$ 635,137.65
51H	CABLE INSPECTION	8	11,394.6	1,519.3	$ 287,380.83	$ 58,926.71	$ 468,483.91
56A	PIPEFITTING SHOP	37	17,008.4	2,267.8	$ 1,362,691.73	$ 87,958.25	$ 699,292.80
56B	AC&R SHOP	29	11,064.5	1,475.3	$ 1,041,575.51	$ 57,219.61	$ 454,912.00
56C	FLEXIBLE HOSE SHOP	13	12,454.0	1,660.5	$ 404,927.24	$ 64,405.35	$ 512,040.67
57A	LAGGING SHOP	41	34,865.3	4,648.7	$ 1,313,850.68	$ 180,304.48	$ 1,433,471.30
64A	PATTERN SHOP	8	7,913.7	1,055.2	$ 299,443.50	$ 40,925.38	$ 325,368.26
64E	KEY & LOCK SHOP	2	6,074.0	809.9	$ 68,198.40	$ 31,411.44	$ 249,729.81
67A	ELECTRONICS REPAIR	25	15,260.7	2,034.8	$ 967,626.00	$ 78,920.09	$ 627,436.89
67B	ELECTRONICS CAL LAB	12	15,391.8	2,052.2	$ 410,233.26	$ 79,598.07	$ 632,827.01
67D	TELETYPE REPAIR SHOP	14	423.5	56.5	$ 520,360.00	$ 2,190.11	$ 17,412.01
67E	FIRE CONTROL SHOP	18	17,993.4	2,399.1	$ 712,509.33	$ 93,052.14	$ 739,790.64
67G	SONAR REPAIR SHOP	8	1,557.2	207.6	$ 308,476.00	$ 8,053.00	$ 64,023.59
67H	ANTENNA REPAIR SHOP	23	13,904.4	1,853.9	$ 799,876.00	$ 71,906.04	$ 571,673.22
67K	TEST EQUIPMENT REPAIR	8	11,214.5	1,495.3	$ 272,985.00	$ 57,995.33	$ 461,079.18
67L	ADP REPAIR (84C) (67X) (67T)	9	13,397.7	1,786.4	$ 320,813.42	$ 69,285.66	$ 550,840.48
67M	MICRO MINIATURE REPAIR (84D)	8	3,444.2	459.2	$ 305,194.12	$ 17,811.54	$ 141,606.75
67W	SLQ-32 REPAIR	14	8,490.2	1,132.0	$ 513,173.38	$ 43,906.72	$ 349,070.80
68C	LIFE RAFT REPAIR	14	11,449.6	1,526.6	$ 452,783.25	$ 59,211.14	$ 470,745.21
71B	CORROSION CONTROL	26	29,404.3	3,920.6	$ 894,439.00	$ 152,063.14	$ 1,208,944.72
72A	OUTSIDE RIGGING	21	22,714.0	3,028.5	$ 740,784.67	$ 117,464.53	$ 933,876.01
72C	INSIDE RIGGING	8	7,207.6	961.0	$ 304,353.00	$ 37,273.81	$ 296,337.27
72D	WEIGHT TESTING SHOP	4	7,462.0	994.9	$ 201,438.36	$ 38,589.43	$ 306,796.81
74A	SAIL LOFT/UPHOLSTERY (74Z)	13	25,034.2	3,337.9	$ 444,618.00	$ 129,463.35	$ 1,029,270.00
81A	FOUNDRY SHOP	10	16,472.7	2,196.4	$ 350,500.31	$ 85,187.90	$ 677,267.73
92A	SOUND ANALYSIS	6	5,117.3	682.3	$ 239,944.57	$ 26,463.91	$ 210,395.51
95B	TEST/SPECTRO LAB	1	6,110.9	814.8	$ 55,734.96	$ 31,602.27	$ 251,246.94
96A	MIRCS LAB	13	14,278.4	1,903.8	$ 457,953.00	$ 73,840.17	$ 587,050.07
96B	OUTSIDE CALIBRATION	24	21,572.0	2,876.3	$ 889,493.30	$ 111,558.72	$ 886,923.19
	TOTAL	1077	913,656.8	121,820.9	$ 39,288,076.82	$ 4,724,944.17	$ 37,564,634.11

Table 25. FY95 SIMA San Diego Manday Rate

SHOP	EQUIPMENT DEPRECIATION	INTERNAL COST SUB-TOTAL	INTERNAL COST MANDAY RATE	SECURITY	FIRE PROTECTION	PERSONNEL SUPPORT	TOTAL	MANDAY RATE
	$ 0.608			$ 1.056	$ 0.261	$ 1.408		
11A	$ 30,782.75	$ 4,559,350	$ 675.26	$ 53,464	$ 13,202	$ 71,295	$ 4,697,312	$ 695.69
17A	$ 15,683.00	$ 2,260,845	$ 657.22	$ 27,239	$ 6,726	$ 36,323	$ 2,331,133	$ 677.66
26A	$ 6,204.05	$ 924,946	$ 679.69	$ 10,775	$ 2,661	$ 14,369	$ 952,751	$ 700.13
26Z	$ 3,222.93	$ 274,599	$ 388.44	$ 5,598	$ 1,382	$ 7,465	$ 289,043	$ 408.87
31A	$ 27,942.72	$ 4,418,051	$ 720.83	$ 48,532	$ 11,984	$ 64,717	$ 4,543,284	$ 741.27
31B	$ 1,655.17	$ 259,668	$ 715.23	$ 2,875	$ 710	$ 3,833	$ 267,086	$ 735.67
31D	$ 25,579.14	$ 3,842,412	$ 684.84	$ 44,426	$ 10,971	$ 59,243	$ 3,957,052	$ 705.27
31E	$ 22,582.03	$ 3,332,322	$ 672.75	$ 39,221	$ 9,685	$ 52,302	$ 3,433,530	$ 693.19
31F	$ 3,388.27	$ 698,353	$ 939.66	$ 5,885	$ 1,453	$ 7,847	$ 713,539	$ 960.09
31G	$ 25,874.50	$ 4,034,400	$ 710.85	$ 44,939	$ 11,097	$ 59,927	$ 4,150,364	$ 731.29
31H	$ 13,746.57	$ 1,590,901	$ 527.62	$ 23,875	$ 5,896	$ 31,838	$ 1,652,510	$ 548.05
31T	$ 26,344.87	$ 2,798,005	$ 484.20	$ 45,756	$ 11,299	$ 61,017	$ 2,916,077	$ 504.63
31Z	$ 4,527.12	$ 732,207	$ 737.37	$ 7,863	$ 1,942	$ 10,485	$ 752,496	$ 757.80
35A	$ 4,195.89	$ 537,113	$ 583.60	$ 7,288	$ 1,800	$ 9,718	$ 555,918	$ 604.03
35D	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
35E	$ 1.15	$ 89	$ 351.70	$ 2	$ 0	$ 3	$ 94	$ 372.14
37A	$ 6,925.53	$ 744,877	$ 490.35	$ 12,028	$ 2,970	$ 16,040	$ 775,916	$ 510.78
38A	$ 18,120.87	$ 2,669,461	$ 671.61	$ 31,473	$ 7,772	$ 41,969	$ 2,750,675	$ 692.04
38B	$ 17,876.38	$ 2,894,348	$ 738.15	$ 31,048	$ 7,667	$ 41,403	$ 2,974,466	$ 758.58
38Y	$ 5,321.66	$ 950,123	$ 813.96	$ 9,243	$ 2,282	$ 12,325	$ 973,973	$ 834.40
38Z	$ 8,881.29	$ 1,089,996	$ 559.53	$ 15,425	$ 3,809	$ 20,570	$ 1,129,800	$ 579.96
41A	$ 24,737.78	$ 3,580,565	$ 659.88	$ 42,965	$ 10,610	$ 57,294	$ 3,691,434	$ 680.31
41B	$ 3,069.38	$ 767,018	$ 1,139.27	$ 5,331	$ 1,316	$ 7,109	$ 780,774	$ 1,159.70
51A	$ 11,346.15	$ 2,596,405	$ 1,043.27	$ 19,706	$ 4,866	$ 26,278	$ 2,647,256	$ 1,063.70
51B	$ 13,878.78	$ 2,374,249	$ 779.92	$ 24,105	$ 5,952	$ 32,144	$ 2,436,451	$ 800.35
51G	$ 9,390.39	$ 1,972,728	$ 957.76	$ 16,309	$ 4,027	$ 21,749	$ 2,014,813	$ 978.19
51H	$ 6,926.44	$ 821,718	$ 540.86	$ 12,030	$ 2,971	$ 16,042	$ 852,761	$ 561.29
56A	$ 10,338.91	$ 2,160,282	$ 952.59	$ 17,957	$ 4,434	$ 23,946	$ 2,206,618	$ 973.03
56B	$ 6,725.79	$ 1,560,433	$ 1,057.73	$ 11,682	$ 2,885	$ 15,577	$ 1,590,576	$ 1,078.16
56C	$ 7,570.42	$ 988,944	$ 595.56	$ 13,148	$ 3,247	$ 17,534	$ 1,022,873	$ 615.99
57A	$ 21,193.59	$ 2,948,820	$ 634.33	$ 36,810	$ 9,090	$ 49,086	$ 3,043,805	$ 654.76
64A	$ 4,810.51	$ 670,548	$ 635.49	$ 8,355	$ 2,063	$ 11,141	$ 692,107	$ 655.93
64E	$ 3,692.21	$ 353,032	$ 435.91	$ 6,413	$ 1,584	$ 8,551	$ 369,580	$ 456.35
67A	$ 9,276.53	$ 1,683,260	$ 827.25	$ 16,112	$ 3,979	$ 21,485	$ 1,724,835	$ 847.68
67B	$ 9,356.22	$ 1,132,015	$ 551.60	$ 16,250	$ 4,013	$ 21,670	$ 1,173,947	$ 572.03
67D	$ 257.43	$ 540,220	$ 9,567.05	$ 447	$ 110	$ 596	$ 541,373	$ 9,587.49
67E	$ 10,937.66	$ 1,556,290	$ 648.69	$ 18,997	$ 4,691	$ 25,332	$ 1,605,310	$ 669.12
67G	$ 946.58	$ 381,499	$ 1,837.43	$ 1,644	$ 406	$ 2,192	$ 385,742	$ 1,857.86
67H	$ 8,452.08	$ 1,451,907	$ 783.16	$ 14,680	$ 3,625	$ 19,576	$ 1,489,788	$ 803.59
67K	$ 6,816.97	$ 798,876	$ 534.27	$ 11,840	$ 2,924	$ 15,789	$ 829,429	$ 554.70
67L	$ 8,144.07	$ 949,084	$ 531.29	$ 14,145	$ 3,493	$ 18,862	$ 985,584	$ 551.73
67M	$ 2,093.63	$ 466,706	$ 1,016.29	$ 3,636	$ 898	$ 4,849	$ 476,089	$ 1,036.72
67W	$ 5,160.94	$ 911,312	$ 805.03	$ 8,964	$ 2,213	$ 11,953	$ 934,442	$ 825.46
68C	$ 6,959.88	$ 989,699	$ 648.30	$ 12,088	$ 2,985	$ 16,120	$ 1,020,892	$ 668.73
71B	$ 17,874.01	$ 2,273,321	$ 579.84	$ 31,044	$ 7,666	$ 41,397	$ 2,353,428	$ 600.28
72A	$ 13,807.18	$ 1,805,932	$ 596.31	$ 23,981	$ 5,922	$ 31,978	$ 1,867,813	$ 616.74
72C	$ 4,381.29	$ 642,345	$ 668.40	$ 7,610	$ 1,879	$ 10,147	$ 661,981	$ 688.84
72D	$ 4,535.93	$ 551,361	$ 554.17	$ 7,878	$ 1,945	$ 10,506	$ 571,690	$ 574.60
74A	$ 15,217.56	$ 1,618,569	$ 484.91	$ 26,430	$ 6,527	$ 35,245	$ 1,686,771	$ 505.34
81A	$ 10,013.27	$ 1,122,969	$ 511.29	$ 17,391	$ 4,295	$ 23,191	$ 1,167,847	$ 531.72
92A	$ 3,110.66	$ 479,915	$ 703.37	$ 5,403	$ 1,334	$ 7,204	$ 493,856	$ 723.80
95B	$ 3,714.64	$ 342,299	$ 420.11	$ 6,452	$ 1,593	$ 8,603	$ 358,947	$ 440.54
96A	$ 8,679.42	$ 1,127,523	$ 592.25	$ 15,075	$ 3,722	$ 20,102	$ 1,166,422	$ 612.69
96B	$ 13,112.99	$ 1,901,088	$ 660.96	$ 22,775	$ 5,624	$ 30,371	$ 1,959,858	$ 681.39
	$ 555,385.81	$ 82,132,994	$ 674.21	$ 964,608	$ 238,197	$ 1,286,312	$ 84,622,109	$ 694.64

Table 25 (Continued)

15 E-5s and 10 E-6s). This variation would not be expected because of differing overall manning levels in a shop if labor levels were flexible (higher manning levels would be a result of higher DLHs, so the manday rate would not be affected by differing manning levels). Because SIMA San Diego's labor costs are fixed and do not vary with the level of effort, the manday rates themselves vary.

The manday rate calculated using the internal costs of SIMA San Diego are the most comparable to manday rates computed through the use of Naval Audit Service (NAS) IMA Cost Templates. This manday rate, $674.21, is found in Table 25 in the Internal Cost Sub-Total column. The researcher did not study the NAS templates or their procedures in depth, as the goal of this study is not to compare the manday rate calculated here with NAS manday rates. The researcher did, however, review a report based on these procedures and feels the types of internal costs captured using the methodology of this study are comparable with the types of costs captured with the NAS templates. While not identical, they are very similar. In this study, $82,132,994 of internal costs were captured for use in determining the manday rate. A recent study to calculate SIMA San Diego's FY 95 manday rate, conducted by ERSG using NAS procedures, captured $81,056,755 in costs. The purpose here is to compare these total costs, developed using two separate procedures, and not to compare the manday rates. The conclusion can be made that the operating costs for SIMA San Diego are approximately $81 to $82 million, with any difference being negligible.

Tables 26 and 27 present the total costs which need to be accounted for and the total costs accounted for in this study, respectively. The costs to be accounted for are drawn from Table 10. The costs charged directly to customers are those costs not used in the calculations of indirect, G&A or depreciation allocation rates. The amounts in Table 27 are the total amounts allocated for indirect, G&A and

depreciation in Table 25. The $49 difference between costs to account for and costs accounted for is due to rounding errors.

TOTAL APPROPRIATED FUNDS FOR SIMA SAN DIEGO (FY 95)	$ 116,869,371
FUNDS MANAGED FOR OTHER COMMANDS	$ (580,397)
FUNDS PROVIDED FROM EXTERNAL COMMANDS FOR EQUIPMENT PURCHASES (DEPRECIABLE ITEMS ONLY)	$ (804,088)
DEPRECIATION EXPENSE	$ 555,385
COSTS CHARGED TO CUSTOMER IN ADDITION TO MANDAY RATE (DIRECT COSTS)	$ (33,907,277)
BASE SUPPORT COSTS	$ 2,489,115
TOTAL COSTS TO ACCOUNT FOR	$ 84,622,109

Table 26. Total Costs to Account For

DIRECT MILITARY LABOR	$ 39,288,077
G&A EXPENSES	$ 4,724,944
INDIRECT EXPENSES	$ 37,564,634
DEPRECIATION EXPENSE	$ 555,386
SECURITY DEPARTMENT	$ 964,608
FIRE DEPARTMENT	$ 238,197
PERSONNEL SUPPORT	$ 1,286,312
TOTAL COSTS ACCOUNTED FOR	$ 84,622,158

Table 27. Total Costs Accounted For

Different variations of the manday rate can be calculated by using different levels of production. This can be accomplished because the FY 95 operating costs have been calculated and, as discussed in the previous section, the operating costs are mostly fixed. In fact, the total operating costs which were used to compute the manday rate are only $5.8 million over the $76.3 million in fixed operating costs.

This ability to use different production levels provides predictive value for future manday rates. Planned production levels can be used to determine approximate manday rates based on estimated growth in the costs used in this study. Additionally, different manday rates can be calculated for FY 95. For example, Table 7, SIMA San Diego FY 95 Manhours, shows 97,746 manhours unassigned to jobs (the workers were available, but there was no work for them to perform). If these hours were actually productive, the manday rate would be $627.51. Table 7 also shows 154,473 manhours which are not accounted for. All of these hours were available for production and, if actually productive, would lead to a manday rate of $594.20. If both unassigned to jobs and unaccounted for manhours were productive hours, a sum of 252,219 manhours, the manday rate would be $544.37. These alternative manday rates are extremes as they allow for no idle time and/or require accountability of all hours, neither of which is likely.

Another implication of the fixed nature of SIMA's operating costs is that the manday rate decreases as workload increases. As shown above, as the productive hours increase, within current capacity limits, the manday rate decreases. It is true that with the addition of these hours there is not a corresponding increase made in operating costs, but, as was previously shown, there is not a significant change in operational costs with an increase in production efforts. The more work SIMA San Diego performs, within capacity levels, the lower the manday rate is as a result of the fixed nature of its operating costs.

C. NET OPERATING RESULT

If SIMA San Diego had been a member of the DBOF in FY 95 and charged the computed manday rate of $694.64 for the maintenance and repairs it performed, its net operating result (NOR) would have been a gain of $7,245,606. This NOR is based on the calculated manday rate (which used Earned Production Hours) multiplied by

the Expended Production Hours (converted to mandays) for FY 95. It must be noted that this NOR is overstated. Expended Production Hours include Lost Time in their total. Lost Time includes a variety of items, such as waiting for parts or actions to be completed by ship's force, but, most importantly, includes time used for rework. NSYs do not charge their customers for rework and, therefore, these hours would not be counted as direct labor hours. Because a detailed breakdown of Lost Time is not available and no estimations can be made of the rework hours included in the total, all Lost Time hours are included in the computation of the NOR. If all Lost Time were excluded from the Expended Hours, the NOR would be a loss of $3,738,783. This represents a difference of $10,984,389 between the two NORs.

D. NSY AND SIMA MANDAY RATE COMPARISON

This section compares the computed SIMA composite manday rate and the adjusted NSY composite manday rates. It should be noted that this is a comparison of the cost of levels of effort, not of productivity. That is, the rates are compared strictly as manday rates. No allowance is made for the different productivities or efficiencies of the organizations.[29]

Table 28 presents the FY 95 composite manday rates for the NSYs (adjusted) and for SIMA San Diego. The mean of the NSY rates is $513.35 with a standard deviation of $92.34. The calculated SIMA manday rate of $694.64 is 1.96 standard deviations above the NSY mean. The difference in manday rates would not be statistically significant at a 95 percent confidence level. At any confidence level

[29]As was discussed in Chapter III, no adjustments have been made in this study for the different skill levels of the workers. For example, the overhaul of a diesel engine might require 75 manhours in a NSY. The overhaul of the same engine might earn SIMA 95 manhours. This difference would be attributed to the use of different standards, as a result of differing skill levels.

ACTIVITY	FY 95 MANDAY RATE
SIMA SAN DIEGO	$694.64
PEARL HARBOR NSY	$661.80
LONG BEACH NSY	$508.98
NORFOLK NSY	$506.64
PORTSMOUTH NSY	$480.51
PUGET SOUND NSY	$408.83

Table 28. NSY and SIMA Manday Rate Comparison

below 95 percent, the calculated SIMA San Diego FY 95 manday rate would be significantly higher, statistically, than the FY 95 NSY manday rates.

E. THE COST OF A FIXED MANNING LEVEL

In this section an alternative manday rate for SIMA San Diego is developed by assuming a flexible production labor force. The development of this manday rate is less complete than the $694.64 rate calculated above. This limitation is a result of the inability to separate support and production personnel and the unavailability of detailed hourly data for support hours. In lieu of the fixed Direct Labor Cost, an average hourly labor cost for each shop is used to calculate the Direct Labor Cost for the level of work which was performed. The intent is to identify the labor costs associated with idle and non-productive hours, which a DBOF activity would either not have (because it can vary its manning) or not pay for (because employees are paid an hourly rate). This, as shown below, removes the influence of having a fixed, salaried labor force on the individual shop manday rates and identifies the costs associated with having a fixed labor force.

Because there is not specific data available as to which personnel performed support functions and which performed production functions, this average hourly shop labor cost is estimated using the weighted average of hourly labor costs of E-6

and below.[30] The use of E-6 and below was considered appropriate in order to not include support labor costs twice, once in the support costs calculated using the percentage of production and support hours, as previously discussed, and, once in the average hourly cost.

The Indirect and General & Administrative allocation rates have increased due to the inclusion of additional labor costs in those categories. These additional labor costs are a result of shifting labor costs for Training, Administrative, Special Assignment and Other hours from direct labor into the overhead categories. These costs were calculated using an average hourly rate of $16.84 for SIMA. Table 29 summarizes these hours and their effects on the overhead rates. This, in effect, has removed the labor costs for Special Liberty, Unauthorized Absence, Medical, Unaccounted Hours and Hours Unassigned to JCNs from SIMAs labor costs. For Production Hours, the researcher was able to obtain information as to how the hours were expended by category (i.e., Training, Special Liberty, Production). Unfortunately, a breakdown of Support Hours into these categories was not available and these hours have remained as fixed costs. If this information were available it would most likely reduce the overhead rates by removing labor costs which should not be incurred (i.e., Special Liberty hours).

Using hourly labor costs produces an FY 95 composite manday rate for SIMA of $572.15, which is within one standard deviation of the FY 95 NSY composite manday rate average. This manday rate is not significantly different from the NSY rates at a 95% confidence level. Additionally, the large variance in the individual

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[30]The hourly labor cost used is a weighted average of E-6 and below for all shops except the Weight Test Shop (72D). 72D, according to the AMD, is manned entirely by E-7 and above, which are generally considered support personnel. The labor costs for 72D were calculated using E-7 and above hourly rates.

CATEGORY	NUMBER OF HOURS	LABOR COST	INCLUDED IN	AFFECT ON ALLOCATION RATE
TRAINING	239,000	$4,024,753.26	G&A	$4.405
ADMINISTRATIVE	44,468	$ 748,832.70	G&A	$0.820
SPECIAL	224,366	$3,778,316.70	INDIRECT	$4.135
OTHER	25,963	$ 437,221.97	INDIRECT	$0.479
TOTAL	533,796	$8,989,124.97		$9.839

Table 29. Summary of G&A and Indirect Labor Hours

shops' manday rates has been removed, with all shops now falling within $100 of the composite manday rate. Table 30 presents the calculations of the manday rates. Table 31 provides a comparison of the manday rates calculated using a flexible production force and using the fixed production force. From this table, the cost to the Navy of maintaining a fixed production force at SIMA San Diego was $14,922,797 for FY 95.[31]

[31]As mentioned previously, the computation of a manday rate using hourly labor costs for support personnel would likely reduce overhead rates, which, therefore, would also reduce both the composite manday rate and total recoverable costs. Because Gross Support Hours (49.83 percent of Total Manhours Assigned) are almost equivalent to Gross Production Hours (50.17 percent of Total Manhours Assigned), the assumption could be made that a calculation using hourly labor costs for support personnel would result in reductions to the manday rate and total costs approximately the same as the reductions to the manday rate and total costs computed in this section using hourly labor costs for production personnel. This assumption requires that the distribution of support hours into the different categories (i.e., Special Liberty, Training, Medical, etc.) are similar to the distribution of production hours into these same categories. Based on this assumption, the composite manday rate for SIMA San Diego would be reduced by an additional $120 (approximately), resulting in a manday rate of $450. This is below the average NSY composite manday rate ($513.35) and within one standard deviation ($92.34). Additionally, the total recoverable costs would also be reduced by an additional $15 million (the approximate cost of maintaining a fixed support labor force) which would result in a total cost of maintaining a fixed labor force of approximately $30 million.

F. SUMMARY

This thesis provides a manday rate for an intermediate maintenance activity which is directly comparable to a depot level activity composite manday rate. In the process of computing this manday rate, several assumptions were made which, affect the manday rate as summarized in Table 21. The majority of these assumptions and their effects cause the manday rate calculated to be somewhat understated. The nature of the assumptions and the potential magnitude of their combined effects are considered negligible, but estimates of their impact are provided, where possible. The two major conclusions made in this study are that the costs of operating a SIMA are, for the most part, fixed and that there are significant costs associated with maintaining a fixed labor force.

The significance of the fixed nature of costs for operating intermediate maintenance activities is that the incremental cost for performing maintenance at an IMA is minimal. That is, the majority of costs for performing maintenance at an IMA do not change as the workload changes (within the current capacity levels). This implies that the more work an IMA performs, the less the maintenance appears to cost, as measured by a manday rate for level of effort. This also means that an IMA is most cost effective when it operates at, or above, its current capacity level.[32]

Because a SIMA has a fixed level of manning it has a fixed capacity level (with some variation achieved by the use of overtime or shift work). If a SIMA does not operate continuously at this capacity level, there are labor costs which, while being paid for, are non-productive or idle time. Activities, such as NSYs, which are able to vary manning levels to fit the workload level would not incur these costs. In effect, IMAs must manage their workload to their manning level while NSYs vary

[32]As an IMA operates above its current capacity level its costs do not significantly increase due to higher labor costs. A NSY would experience increased labor costs when operating over its capacity level due to overtime and/or other incentive costs (i.e., 2nd or 3rd shift pay).

SHOP		TOTAL DIRECT LABOR HOURS	DIRECT MANDAYS	AVERAGE DIRECT LABOR COST PER HOUR	DIRECT LABOR COST	G&A ALLOCATION
	ALLOCATION RATE					$ 10.396
11A	SHIPFITTER SHOP	50,640.3	6752	$ 16.48	$ 834,369.84	$ 526,465.65
17A	SHEETMETAL SHOP	25,799.9	3440	$ 16.51	$ 425,935.98	$ 268,220.39
26A	WELDING SHOP	10,206.2	1361	$ 16.80	$ 171,457.36	$ 106,105.49
26Z	WELDING REQUAL SCHOOL	5,302.0	707	$ 18.73	$ 99,279.95	$ 55,120.54
31A	INSIDE MACHINE SHOP	45,968.2	6129	$ 16.75	$ 770,174.21	$ 477,893.66
31B	MECHANICAL ENGRAVING	2,722.9	363	$ 15.86	$ 43,192.00	$ 28,307.76
31D	VALVE REPAIR/TEST (1/2 38N)	42,079.9	5611	$ 16.44	$ 691,793.56	$ 437,470.19
31E	IC ENGINE SHOP (31C)	37,149.4	4953	$ 16.77	$ 623,011.59	$ 386,211.83
31F	HYDRAULIC REPAIR SHOP	5,574.0	743	$ 17.28	$ 96,331.58	$ 57,948.30
31G	PUMP REPAIR (1/2 38N)	42,565.8	5675	$ 17.24	$ 734,007.12	$ 442,521.70
31H	ALRE REPAIR	22,614.3	3015	$ 17.83	$ 403,199.67	$ 235,102.32
31T	GAS TURBINE REPAIRS	43,339.6	5779	$ 17.12	$ 741,850.12	$ 450,566.26
31Z	METAL BUILD UP SHOP	7,447.5	993	$ 17.14	$ 127,650.15	$ 77,425.55
35A	OPTICAL SHOP	6,902.6	920	$ 16.33	$ 112,684.95	$ 71,760.67
35D	WATCH/CLOCK REPAIR	0.0	0	$ 18.73	$ -	$ -
35E	TYPEWRITER REPAIR	1.9	0	$ 15.53	$ 29.50	$ 19.75
37A	PRINT SHOP	11,393.1	1519	$ 15.42	$ 175,695.84	$ 118,444.71
38A	AUXILIARY SHOP	29,810.4	3975	$ 16.87	$ 502,975.97	$ 309,914.27
38B	ORDNANCE REPAIR	29,408.2	3921	$ 17.98	$ 528,865.00	$ 305,732.93
38Y	ORDNANCE ALTERATION	8,754.6	1167	$ 19.13	$ 167,495.70	$ 91,014.39
38Z	AIR COMPRESSOR/ALIGNMENT SHOP	14,610.5	1948	$ 17.22	$ 251,536.62	$ 151,893.38
41A	BOILER REPAIR SHOP	40,695.8	5426	$ 16.53	$ 672,686.50	$ 423,080.84
41B	BOILER OUTSIDE REPAIR	5,049.4	673	$ 18.00	$ 90,880.29	$ 52,494.47
51A	INSIDE ELECTRICAL	18,665.4	2489	$ 16.68	$ 311,413.53	$ 194,048.85
51B	OUTSIDE ELECTRICAL	22,831.8	3044	$ 16.81	$ 383,708.25	$ 237,363.49
51G	GYRO/IC REPAIR	15,448.0	2060	$ 17.26	$ 266,607.33	$ 160,600.18
51H	CABLE INSPECTION	11,394.6	1519	$ 17.74	$ 202,083.23	$ 118,460.31
56A	PIPEFITTING SHOP	17,008.4	2268	$ 17.07	$ 290,329.69	$ 176,822.38
56B	AC&R SHOP	11,064.5	1475	$ 16.81	$ 185,987.33	$ 115,028.53
56C	FLEXIBLE HOSE SHOP	12,454.0	1661	$ 14.47	$ 180,263.87	$ 129,474.02
57A	LAGGING SHOP	34,865.3	4649	$ 14.55	$ 507,319.17	$ 362,465.92
64A	PATTERN SHOP	7,913.7	1055	$ 16.81	$ 132,989.73	$ 82,272.25
64E	KEY & LOCK SHOP	6,074.0	810	$ 20.49	$ 124,456.26	$ 63,146.39
67A	ELECTRONICS REPAIR	15,260.7	2035	$ 17.43	$ 266,032.15	$ 158,652.98
67B	ELECTRONICS CAL LAB	15,391.8	2052	$ 16.18	$ 249,015.64	$ 160,015.92
67D	TELETYPE REPAIR SHOP	423.5	56	$ 17.11	$ 7,247.06	$ 4,402.78
67E	FIRE CONTROL SHOP	17,993.4	2399	$ 18.45	$ 331,911.94	$ 187,062.62
67G	SONAR REPAIR SHOP	1,557.2	208	$ 18.53	$ 28,853.19	$ 16,188.93
67H	ANTENNA REPAIR SHOP	13,904.4	1854	$ 15.81	$ 219,888.15	$ 144,552.64
67K	TEST EQUIPMENT REPAIR	11,214.5	1495	$ 16.79	$ 188,266.53	$ 116,587.96
67L	ADP REPAIR (84C) (67X) (67T)	13,397.7	1786	$ 17.09	$ 228,993.49	$ 139,284.89
67M	MICRO MINIATURE REPAIR (84D)	3,444.2	459	$ 18.01	$ 62,021.43	$ 35,806.52
67W	SLQ-32 REPAIR	8,490.2	1132	$ 17.48	$ 148,440.53	$ 88,265.64
68C	LIFE RAFT REPAIR	11,449.6	1527	$ 14.80	$ 169,415.91	$ 119,032.10
71B	CORROSION CONTROL	29,404.3	3921	$ 15.66	$ 460,572.42	$ 305,692.38
72A	OUTSIDE RIGGING	22,714.0	3029	$ 16.06	$ 364,847.99	$ 236,138.82
72C	INSIDE RIGGING	7,207.6	961	$ 16.48	$ 118,800.91	$ 74,931.50
72D	WEIGHT TESTING SHOP	7,462.0	995	$ 25.37	$ 189,286.07	$ 77,576.29
74A	SAIL LOFT/UPHOLSTERY (74Z)	25,034.2	3338	$ 15.83	$ 396,166.22	$ 260,260.04
81A	FOUNDRY SHOP	16,472.7	2196	$ 16.68	$ 274,779.61	$ 171,253.15
92A	SOUND ANALYSIS	5,117.3	682	$ 17.56	$ 89,852.48	$ 53,200.37
95B	TEST/SPECTRO LAB	6,110.9	815	$ 20.49	$ 125,212.34	$ 63,530.01
96A	MIRCS LAB	14,278.4	1904	$ 16.85	$ 240,626.74	$ 148,440.81
96B	OUTSIDE CALIBRATION	21,572.0	2876	$ 16.95	$ 365,645.40	$ 224,266.38
	TOTAL	913,656.8	121821	$ 16.84	$ 15,386,663.96	$ 9,498,550.52

Table 30. Manday Rates Using Houly Labor Costs

SHOP	INDIRECT ALLOCATION	EQUIPMENT DEPRECIATION	SUB-TOTAL	MANDAY RATE	SECURITY	FIRE PROTECTION	PERSONNEL SUPPORT	TOTAL	MANDAY RATE
	$ 45.728	$ 0.608			$ 1.056	$ 0.261	$ 1.408		
11A	$ 2,315,703.76	$ 30,782.75	$ 3,707,322	$ 549.07	$ 53,464	$ 13,202	$ 71,295	$ 3,845,284	$ 569.50
17A	$ 1,179,790.12	$ 15,683.00	$ 1,889,629	$ 549.31	$ 27,239	$ 6,726	$ 36,323	$ 1,959,917	$ 569.75
26A	$ 466,713.98	$ 6,204.05	$ 750,481	$ 551.49	$ 10,775	$ 2,661	$ 14,369	$ 778,286	$ 571.92
26Z	$ 242,452.38	$ 3,222.93	$ 400,076	$ 565.93	$ 5,598	$ 1,382	$ 7,465	$ 414,520	$ 586.36
31A	$ 2,102,055.75	$ 27,942.72	$ 3,378,066	$ 551.15	$ 48,532	$ 11,984	$ 64,717	$ 3,503,300	$ 571.59
31B	$ 124,514.07	$ 1,655.17	$ 197,669	$ 544.46	$ 2,875	$ 710	$ 3,833	$ 205,087	$ 564.90
31D	$ 1,924,249.71	$ 25,579.14	$ 3,079,093	$ 548.79	$ 44,426	$ 10,971	$ 59,243	$ 3,193,733	$ 569.23
31E	$ 1,698,785.46	$ 22,582.03	$ 2,730,591	$ 551.27	$ 39,221	$ 9,685	$ 52,302	$ 2,831,799	$ 571.70
31F	$ 254,890.53	$ 3,388.27	$ 412,559	$ 555.11	$ 5,885	$ 1,453	$ 7,847	$ 427,744	$ 575.54
31G	$ 1,946,469.18	$ 25,874.50	$ 3,148,873	$ 554.82	$ 44,939	$ 11,097	$ 59,927	$ 3,264,836	$ 575.26
31H	$ 1,034,117.48	$ 13,746.57	$ 1,686,166	$ 559.21	$ 23,875	$ 5,896	$ 31,838	$ 1,747,775	$ 579.65
31T	$ 1,981,853.87	$ 26,344.87	$ 3,200,615	$ 553.87	$ 45,756	$ 11,299	$ 61,017	$ 3,318,687	$ 574.31
31Z	$ 340,562.83	$ 4,527.12	$ 550,166	$ 554.04	$ 7,863	$ 1,942	$ 10,485	$ 570,455	$ 574.48
35A	$ 315,645.38	$ 4,195.89	$ 504,287	$ 547.93	$ 7,288	$ 1,800	$ 9,718	$ 523,092	$ 568.36
35D	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
35E	$ 86.88	$ 1.15	$ 137	$ 541.93	$ 2	$ 0	$ 3	$ 142	$ 562.36
37A	$ 520,989.10	$ 6,925.53	$ 822,055	$ 541.15	$ 12,028	$ 2,970	$ 16,040	$ 853,094	$ 561.59
38A	$ 1,363,184.17	$ 18,120.87	$ 2,194,195	$ 552.04	$ 31,473	$ 7,772	$ 41,969	$ 2,275,409	$ 572.47
38B	$ 1,344,792.18	$ 17,876.38	$ 2,197,266	$ 560.37	$ 31,048	$ 7,667	$ 41,403	$ 2,277,385	$ 580.80
38Y	$ 400,334.52	$ 5,321.66	$ 664,166	$ 568.99	$ 9,243	$ 2,282	$ 12,325	$ 688,017	$ 589.42
38Z	$ 668,115.90	$ 8,881.29	$ 1,080,427	$ 554.62	$ 15,425	$ 3,809	$ 20,570	$ 1,120,231	$ 575.05
41A	$ 1,860,956.93	$ 24,737.78	$ 2,981,462	$ 549.47	$ 42,965	$ 10,610	$ 57,294	$ 3,092,331	$ 569.90
41B	$ 230,901.37	$ 3,069.38	$ 377,346	$ 560.48	$ 5,331	$ 1,316	$ 7,109	$ 391,102	$ 580.91
51A	$ 853,540.30	$ 11,346.15	$ 1,370,349	$ 550.62	$ 19,706	$ 4,866	$ 26,278	$ 1,421,200	$ 571.06
51B	$ 1,044,063.43	$ 13,878.78	$ 1,679,014	$ 551.54	$ 24,105	$ 5,952	$ 32,144	$ 1,741,216	$ 571.97
51G	$ 706,413.50	$ 9,390.39	$ 1,143,011	$ 554.93	$ 16,309	$ 4,027	$ 21,749	$ 1,185,097	$ 575.36
51H	$ 521,057.70	$ 6,926.44	$ 848,528	$ 558.51	$ 12,030	$ 2,971	$ 16,042	$ 879,570	$ 578.94
56A	$ 777,768.22	$ 10,338.91	$ 1,255,259	$ 553.52	$ 17,957	$ 4,434	$ 23,946	$ 1,301,596	$ 573.95
56B	$ 505,962.73	$ 6,725.79	$ 813,704	$ 551.56	$ 11,682	$ 2,885	$ 15,577	$ 843,848	$ 572.00
56C	$ 569,502.44	$ 7,570.42	$ 886,811	$ 534.05	$ 13,148	$ 3,247	$ 17,534	$ 920,740	$ 554.48
57A	$ 1,594,337.05	$ 21,193.59	$ 2,485,316	$ 534.63	$ 36,810	$ 9,090	$ 49,086	$ 2,580,301	$ 555.06
64A	$ 361,881.44	$ 4,810.51	$ 581,954	$ 551.53	$ 8,355	$ 2,063	$ 11,141	$ 603,514	$ 571.96
64E	$ 277,754.77	$ 3,692.21	$ 469,050	$ 579.17	$ 6,413	$ 1,584	$ 8,551	$ 485,597	$ 599.60
67A	$ 697,848.56	$ 9,276.53	$ 1,131,810	$ 556.24	$ 16,112	$ 3,979	$ 21,485	$ 1,173,386	$ 576.67
67B	$ 703,843.56	$ 9,356.22	$ 1,122,231	$ 546.83	$ 16,250	$ 4,013	$ 21,670	$ 1,164,164	$ 567.26
67D	$ 19,366.01	$ 257.43	$ 31,273	$ 553.84	$ 447	$ 110	$ 596	$ 32,427	$ 574.27
67E	$ 822,810.77	$ 10,937.66	$ 1,352,723	$ 563.84	$ 18,997	$ 4,691	$ 25,332	$ 1,401,743	$ 584.27
67G	$ 71,208.38	$ 946.58	$ 117,197	$ 564.46	$ 1,644	$ 406	$ 2,192	$ 121,439	$ 584.89
67H	$ 635,827.03	$ 8,452.08	$ 1,008,720	$ 544.10	$ 14,680	$ 3,625	$ 19,576	$ 1,046,600	$ 564.53
67K	$ 512,822.00	$ 6,816.97	$ 824,493	$ 551.40	$ 11,840	$ 2,924	$ 15,789	$ 855,046	$ 571.83
67L	$ 612,656.41	$ 8,144.07	$ 989,079	$ 553.68	$ 14,145	$ 3,493	$ 18,862	$ 1,025,579	$ 574.12
67M	$ 157,498.02	$ 2,093.63	$ 257,420	$ 560.55	$ 3,636	$ 898	$ 4,849	$ 266,803	$ 580.98
67W	$ 388,243.91	$ 5,160.94	$ 630,111	$ 556.62	$ 8,964	$ 2,213	$ 11,953	$ 653,241	$ 577.05
68C	$ 523,572.76	$ 6,959.88	$ 818,981	$ 536.47	$ 12,088	$ 2,985	$ 16,120	$ 850,173	$ 556.90
71B	$ 1,344,613.84	$ 17,874.01	$ 2,128,753	$ 542.97	$ 31,044	$ 7,666	$ 41,397	$ 2,208,860	$ 563.40
72A	$ 1,038,676.61	$ 13,807.18	$ 1,653,471	$ 545.96	$ 23,981	$ 5,922	$ 31,978	$ 1,715,351	$ 566.40
72C	$ 329,592.57	$ 4,381.29	$ 527,706	$ 549.11	$ 7,610	$ 1,879	$ 10,147	$ 547,342	$ 569.55
72D	$ 341,225.89	$ 4,535.93	$ 612,624	$ 615.74	$ 7,878	$ 1,945	$ 10,506	$ 632,953	$ 636.18
74A	$ 1,144,775.82	$ 15,217.56	$ 1,816,420	$ 544.18	$ 26,430	$ 6,527	$ 35,245	$ 1,884,621	$ 564.61
81A	$ 753,271.47	$ 10,013.27	$ 1,209,318	$ 550.60	$ 17,391	$ 4,295	$ 23,191	$ 1,254,195	$ 571.03
92A	$ 234,006.33	$ 3,110.66	$ 380,170	$ 557.18	$ 5,403	$ 1,334	$ 7,204	$ 394,111	$ 577.62
95B	$ 279,442.15	$ 3,714.64	$ 471,899	$ 579.17	$ 6,452	$ 1,593	$ 8,603	$ 488,547	$ 599.60
96A	$ 652,929.48	$ 8,679.42	$ 1,050,676	$ 551.89	$ 15,075	$ 3,722	$ 20,102	$ 1,089,576	$ 572.32
96B	$ 986,454.69	$ 13,112.99	$ 1,589,479	$ 552.62	$ 22,775	$ 5,624	$ 30,371	$ 1,648,249	$ 573.05
	$ 41,780,179.09	$ 555,385.81	$ 67,220,779	$ 551.80	$ 964,608	$ 238,197	$ 1,286,312	$ 69,699,312	$ 572.15

Table 30. (Continued)

		FIXED PRODUCTION FORCE		FLEXIBLE PRODUCTION FORCE		DIFFERENCE (FIXED-FLEXIBLE)	
		TOTAL COSTS	MANDAY RATE	TOTAL COSTS	MANDAY RATE	COSTS	RATE
11A	SHIPFITTER SHOP	$ 4,697,312	$ 695.69	$ 3,845,284	$ 569.50	$ 852,028	$ 126.19
17A	SHEETMETAL SHOP	$ 2,331,133	$ 677.66	$ 1,959,917	$ 569.75	$ 371,215	$ 107.91
26A	WELDING SHOP	$ 952,751	$ 700.13	$ 778,286	$ 571.92	$ 174,465	$ 128.21
26Z	WELDING REQUAL SCHOOL	$ 289,043	$ 408.87	$ 414,520	$ 586.36	$ (125,477)	$ (177.49)
31A	INSIDE MACHINE SHOP	$ 4,543,284	$ 741.27	$ 3,503,300	$ 571.59	$ 1,039,985	$ 169.68
31B	MECHANICAL ENGRAVING	$ 267,086	$ 735.67	$ 205,087	$ 564.90	$ 61,999	$ 170.77
31D	VALVE REPAIR/TEST (1/2 38N)	$ 3,957,052	$ 705.27	$ 3,193,733	$ 569.23	$ 763,319	$ 136.05
31E	IC ENGINE SHOP (31C)	$ 3,433,530	$ 693.19	$ 2,831,799	$ 571.70	$ 601,731	$ 121.48
31F	HYDRAULIC REPAIR SHOP	$ 713,539	$ 960.09	$ 427,744	$ 575.54	$ 285,794	$ 384.55
31G	PUMP REPAIR (1/2 38N)	$ 4,150,364	$ 731.29	$ 3,264,836	$ 575.26	$ 885,528	$ 156.03
31H	ALRE REPAIR	$ 1,652,510	$ 548.05	$ 1,747,775	$ 579.65	$ (95,265)	$ (31.59)
31T	GAS TURBINE REPAIRS	$ 2,916,077	$ 504.63	$ 3,318,687	$ 574.31	$ (402,611)	$ (69.67)
31Z	METAL BUILD UP SHOP	$ 752,496	$ 757.80	$ 570,455	$ 574.48	$ 182,041	$ 183.32
35A	OPTICAL SHOP	$ 555,918	$ 604.03	$ 523,092	$ 568.36	$ 32,826	$ 35.67
35D	WATCH/CLOCK REPAIR	$ -	$ -	$ -	$ -	$ -	$ -
35E	TYPEWRITER REPAIR	$ 94	$ 372.14	$ 142	$ 562.36	$ (48)	$ (190.23)
37A	PRINT SHOP	$ 775,916	$ 510.78	$ 853,094	$ 561.59	$ (77,178)	$ (50.81)
38A	AUXILIARY SHOP	$ 2,750,675	$ 692.04	$ 2,275,409	$ 572.47	$ 475,266	$ 119.57
38B	ORDNANCE REPAIR	$ 2,974,466	$ 758.58	$ 2,277,385	$ 580.80	$ 697,081	$ 177.78
38Y	ORDNANCE ALTERATION	$ 973,973	$ 834.40	$ 688,017	$ 589.42	$ 285,957	$ 244.98
38Z	AIR COMPRESSOR/ALIGNMENT SHOP	$ 1,129,800	$ 579.96	$ 1,120,231	$ 575.05	$ 9,569	$ 4.91
41A	BOILER REPAIR SHOP	$ 3,691,434	$ 680.31	$ 3,092,331	$ 569.90	$ 599,103	$ 110.41
41B	BOILER OUTSIDE REPAIR	$ 780,774	$ 1,159.70	$ 391,102	$ 580.91	$ 389,672	$ 578.79
51A	INSIDE ELECTRICAL	$ 2,647,256	$ 1,063.70	$ 1,421,200	$ 571.06	$ 1,226,056	$ 492.65
51B	OUTSIDE ELECTRICAL	$ 2,436,451	$ 800.35	$ 1,741,216	$ 571.97	$ 695,235	$ 228.38
51G	GYRO/IC REPAIR	$ 2,014,813	$ 978.19	$ 1,185,097	$ 575.36	$ 829,716	$ 402.83
51H	CABLE INSPECTION	$ 852,761	$ 561.29	$ 879,570	$ 578.94	$ (26,810)	$ (17.65)
56A	PIPEFITTING SHOP	$ 2,206,618	$ 973.03	$ 1,301,596	$ 573.95	$ 905,022	$ 399.08
56B	AC&R SHOP	$ 1,590,576	$ 1,078.16	$ 843,848	$ 572.00	$ 746,729	$ 506.17
56C	FLEXIBLE HOSE SHOP	$ 1,022,873	$ 615.99	$ 920,740	$ 554.48	$ 102,133	$ 61.51
57A	LAGGING SHOP	$ 3,043,805	$ 654.76	$ 2,580,301	$ 555.06	$ 463,504	$ 99.71
64A	PATTERN SHOP	$ 692,107	$ 655.93	$ 603,514	$ 571.96	$ 88,594	$ 83.96
64E	KEY & LOCK SHOP	$ 369,580	$ 456.35	$ 485,597	$ 599.60	$ (116,018)	$ (143.26)
67A	ELECTRONICS REPAIR	$ 1,724,835	$ 847.68	$ 1,173,386	$ 576.67	$ 551,449	$ 271.01
67B	ELECTRONICS CAL LAB	$ 1,173,947	$ 572.03	$ 1,164,164	$ 567.26	$ 9,783	$ 4.77
67D	TELETYPE REPAIR SHOP	$ 541,373	$ 9,587.49	$ 32,427	$ 574.27	$ 508,946	$ 9,013.22
67E	FIRE CONTROL SHOP	$ 1,605,310	$ 669.12	$ 1,401,743	$ 584.27	$ 203,567	$ 84.85
67G	SONAR REPAIR SHOP	$ 385,742	$ 1,857.86	$ 121,439	$ 584.89	$ 264,302	$ 1,272.97
67H	ANTENNA REPAIR SHOP	$ 1,489,788	$ 803.59	$ 1,046,600	$ 564.53	$ 443,187	$ 239.05
67K	TEST EQUIPMENT REPAIR	$ 829,429	$ 554.70	$ 855,046	$ 571.83	$ (25,617)	$ (17.13)
67L	ADP REPAIR (84C) (67X) (67T)	$ 985,584	$ 551.73	$ 1,025,579	$ 574.12	$ (39,995)	$ (22.39)
67M	MICRO MINIATURE REPAIR (84D)	$ 476,089	$ 1,036.72	$ 266,803	$ 580.98	$ 209,286	$ 455.74
67W	SLQ-32 REPAIR	$ 934,442	$ 825.46	$ 653,241	$ 577.05	$ 281,201	$ 248.40
68C	LIFE RAFT REPAIR	$ 1,020,892	$ 668.73	$ 850,173	$ 556.90	$ 170,719	$ 111.83
71B	CORROSION CONTROL	$ 2,353,428	$ 600.28	$ 2,208,860	$ 563.40	$ 144,568	$ 36.87
72A	OUTSIDE RIGGING	$ 1,867,813	$ 616.74	$ 1,715,351	$ 566.40	$ 152,462	$ 50.34
72C	INSIDE RIGGING	$ 661,981	$ 688.84	$ 547,342	$ 569.55	$ 114,639	$ 119.29
72D	WEIGHT TESTING SHOP	$ 571,690	$ 574.60	$ 632,953	$ 636.18	$ (61,264)	$ (61.58)
74A	SAIL LOFT/UPHOLSTERY (74Z)	$ 1,686,771	$ 505.34	$ 1,884,621	$ 564.61	$ (197,851)	$ (59.27)
81A	FOUNDRY SHOP	$ 1,167,847	$ 531.72	$ 1,254,195	$ 571.03	$ (86,348)	$ (39.31)
92A	SOUND ANALYSIS	$ 493,856	$ 723.80	$ 394,111	$ 577.62	$ 99,745	$ 146.19
95B	TEST/SPECTRO LAB	$ 358,947	$ 440.54	$ 488,547	$ 599.60	$ (129,600)	$ (159.06)
96A	MIRCS LAB	$ 1,166,422	$ 612.69	$ 1,089,576	$ 572.32	$ 76,846	$ 40.36
96B	OUTSIDE CALIBRATION	$ 1,959,858	$ 681.39	$ 1,648,249	$ 573.05	$ 311,609	$ 108.34
	TOTAL	$ 84,622,109	$ 694.64	$ 69,699,312	$ 572.15	$ 14,922,797	$ 122.50

Table 31. Hourly Versus Annual Labor Cost Manday Rates

their manning level to their workload. The labor costs associated with idle and non-productive time are the costs o maintaining a fixed manning level.

APPENDIX A. SIMA SAN DIEGO MANNING AND LABOR COST

This appendix provides a detailed authorized manning and associated labor costs for SIMA San Diego. Table 32, which is a vertical continuation over three pages, includes all Activity Manning Document (AMD) authorized billets summarized by the organizational units prescribed in the AMD. SIMA San Diego does not strictly adhere to the organizational units described by the AMD nor does it necessarily assign personnel to the units as indicated in the AMD. In the continuing process of improvement, several specialized shops have been organized at SIMA San Diego for which manning requirements have not yet been addressed in the AMD. These shops are not addressed in this study and the labor costs associated with them are captured in the parent shop's labor costs— that is, all labor costs for authorized manning are captured in this study, but SIMA San Diego does not necessarily use the labor in the manner in which it has been designated. For example, in FY 95 SIMA had an auxiliary nuclear repair shop (38N) which was not listed in the AMD but was manned from personnel from the pump repair shop (31G) and the valve repair/test shop (31D). In this study the labor costs for 38N were captured in the labor costs for 31D and 31G. There are several other occurences of this, mostly in electronics repair, for which there have been adjustments made in this study. This is addressed in more detail in the section on MRMS data.

Table 32. Authorized Manning

DEPT	COST CENTER	SHOP	O-6	O-5	O-4	O-3	O-2	O-1	W-4	W-3	W-2	E-9	E-8	E-7	E-6	E-5	E-4	E-3	GS-13	GS-12	GS-11	GS-9	GS-7	GS-6	GS-5	GS-4	GS-3	WD-6	WG-11	WG-10	WG-9	WG-7	WL-12	WL-10	WL-9	WN-7	TOTAL BILLETS	LABOR COST
EXECUTIVE	OFFICE OF THE CO		1																																		1	$ 120,909
	OFFICE OF THE XO			1																1	1																3	$ 211,672
	ARRS DIVISION													1	1																						2	$ 92,350
	CMC											1																										1	$ 67,918
	NAVOSH/SAFETY																			1	7				1												9	$ 434,668
ADMIN/	ADMIN DIRECTOR					1																															1	$ 74,368
TRAINING	TRAINING BRANCH												1		4																						5	$ 228,144
	RESERVE AFFAIRS BRANCH														1	1																					2	$ 77,902
	ADMIN/LEGAL DIVISION							1						1	1	5	4	3						1	1												17	$ 562,382
	MAA													1	4																						5	$ 220,222
	HUMAN GOALS												1	3		1																					5	$ 242,104
	RETENTION DIVISION												1		2	1																					4	$ 178,174
	MANPOWER DIVISION											1				2	1				1																5	$ 217,480
PRODUCTION	YARD PLANNING DEPT				1	1																			1												3	$ 188,043
	PLANNING DIVISION	10C																	1																		1	$ 70,848
	WORK ACCEPT/SCHED													4	2					1	4																11	$ 542,571
	CONTRACT MGT/PLANNING												1	2	1					1	1																6	$ 309,014
	HULL PLANNING												1	11	6													1								1	20	$ 960,544
	MACHINERY PLANNING											1	1	12	5		1											1								1	22	$ 1,064,860
	ELEX/ELEC PLANNING													9	2		1											1								1	14	$ 662,246
	QA DIVISION					1							1	3	10	1	1			1		1				1											20	$ 896,803
	INSPECTION SERVICES	93B										1	2	16	3						1																23	$ 1,156,410
	ENG & TECH SVCS DIV																		1																		1	$ 70,848
	MACH DESIGN & ENG BR														1						5	2							1				5				14	$ 616,642
	STRUC DESIGN & ENG BR													2							1		1							1			1	1	1		8	$ 344,450
	TECH LIBRARY BRANCH														1	5					1																7	$ 268,724
	MATERIAL LABS																				1																1	$ 49,710
	CHEMICAL LAB	95A												1	2	3					1																7	$ 290,518
	TEST/SPECTRO LAB	95B													1								1														2	$ 83,602
	STAFF CIVIL ENG DIVISION																			1																	1	$ 59,580
	FACILITIES MANAGEMENT													1	2	2						1										1					7	$ 282,445
	FACILITIES ENGINEERING													1	1																						2	$ 92,350
	EQUIP REPAIR BRANCH	06N																			1																1	$ 49,710
	TOOL ISSUE & REPAIR	06B											1		2	7																					10	$ 389,842
	EQUIP MAINT SHOP	06M										1		1	7	11	3															1		2			26	$ 1,007,267
	TRANSPORTATION	72E												1	2	6	6	3																			18	$ 596,773
REPAIR	YARD PROD/REPAIR OFFICE			1	1																																2	$ 188,938
	SHIP SUPERINTENDENT	10A										1			2	1	1																				5	$ 217,740
	GAS TURBINE BRANCH					1							2	5	3																						11	$ 566,166
	STEAM BRANCH					1							3	3	2																						9	$ 481,738
	AMPHIB/TENDER BRANCH					1							3	5																							9	$ 495,942
	MISC/CARRIER BRANCH							1				1		5										1													7	$ 361,309
	SHIP C&R/WKND REP OFF									1																											1	$ 88,835
R-1	HULL DIVISION	R-31								1		1		8	1	2	2	2																			15	$ 656,445
	STRUC REPAIR BRANCH																																				0	$ -
	SHIPFITTER SHOP	11A										1	1	5	16	32	20	7																			82	$ 2,944,501

Table 32 (Continued)

DEPT	COST CENTER	SHOP	O-6	O-5	O-4	O-3	O-2	O-1	W-4	W-3	W-2	E-9	E-8	E-7	E-6	E-5	E-4	E-3	GS-13	GS-12	GS-11	GS-9	GS-7	GS-6	GS-5	GS-4	GS-3	WD-6	WG-11	WG-10	WG-9	WG-7	WL-12	WL-10	WL-9	WN-7	TOTAL BILLETS	LABOR COST
	SHEETMETAL SHOP	17A											1	1	9	15	10	4																			40	$ 1,412,264
	WELDING SHOP	28A												1	4	6	4	1																			16	$ 573,863
	WELDING REQUAL SCHOOL	28Z													1	1																					2	$ 77,902
	BOILER REPAIR BRANCH									1																											1	$ 68,835
	BOILER REPAIR SHOP	41A										1	1	4	14	20	13	7																			60	$ 2,181,105
	BOILER OUTSIDE REPAIR	41B												1	5	12																					18	$ 686,182
	FLEXIBLE HOSE SHOP	56C												1	2	3	4	7																			17	$ 531,467
	LAGGING SHOP	57A												4	6	8	16	18																			52	$ 1,651,698
	PIPE REPAIR BRANCH									1																											1	$ 68,835
	PIPEFITTING SHOP	56A										1	1	2	12	21	13																				50	$ 1,858,216
R-2	MACHINERY DIVISION	R-32								1		1		1	1	3	2	1																			10	$ 418,312
	MACH REPAIR BRANCH 1					1																															1	$ 74,368
	MECHANICAL ENGRAVING	31B													1	1	1	1																			4	$ 131,981
	VALVE REPAIR/TEST	31D										1	1	5	11	26	17	4																			68	$ 2,407,202
	FLEET VALVE MAINT	56Z													1	1	1																				3	$ 107,200
	OPTICAL SHOP	35A													1	4	3																				8	$ 271,630
	WATCH/CLOCK REPAIR	35D													1	1																					2	$ 77,902
	TYPEWRITER REPAIR	35E														1	1																				2	$ 64,576
	PRINT SHOP	37A												1	1	3	2	2																			9	$ 308,342
	KEY & LOCK SHOP	64E													2																						2	$ 85,248
	MIRCS LAB	96A												1	4	8	2	2																			17	$ 610,604
	OUTSIDE CALIBRATION	96B											1	2	4	14	5																				26	$ 967,978
	MACH REPAIR BRANCH 2									1																											1	$ 68,835
	IC ENGING SHOP	31E										1	1	3	12	20	9	5																			51	$ 1,879,377
	GAS TURBINE REPAIRS	31T										1		2	5	11	5																				24	$ 915,036
	AC&R SHOP	56B											1	2	8	14	8	2																			35	$ 1,275,930
	MACH REPAIR BRANCH 3									1																											1	$ 68,835
	INSIDE MACHINE SHOP	31A											1	4	21	32	21	6																			85	$ 3,044,496
	PUMP REPAIR	31G										1	1	5	21	29	19																				76	$ 2,849,022
	METAL BUILD UP SHOP	31Z												1	3	5	3																				12	$ 441,882
	PATTERN SHOP	64A												1	2	5	3																				11	$ 399,258
	FOUNDRY SHOP	81A												1	3	4	3	1																			12	$ 431,385
	MACH REPAIR BRANCH 4				1																																1	$ 74,368
	HYDRAULIC REPAIR SHOP	31F											2		2	10	1																				15	$ 582,622
	ALRE REPAIR	31H											1		5	11	1																				18	$ 688,124
	AUXILIARY SHOP	38A											1	3	10	18	10	2																			44	$ 1,610,612
	AIR COMP/ALIGN SHOP	38Z												1	4	6	2	1																			14	$ 515,267
R-3	ELECTRICAL REPAIR DIV	R-33			1							1				2																					4	$ 212,840
	SUPPLY SUPPORT	51S													2	1																					3	$ 120,526
	INSIDE ELECTRICAL	51A											1	6	13	23	16	3																			62	$ 2,264,621
	OUTSIDE ELECTRICAL	51B										1		3	11	19	16																				50	$ 1,825,008
	GYROMC REPAIR	51G											1	1	13	20	8	2																			45	$ 1,650,992
	CABLE INSPECTION	51H												1	4	2	1	1																			9	$ 344,857
	SOUND ANALYSIS	92A												1	2	4	1																				8	$ 305,384
R-4	COMBAT SYSTEMS	R-34			1							1			2	2		1																			7	$ 335,057
	EXT COMBAT SYS CS-1							1																													1	$ 82,852
	ORDNANCE REPAIR	38B										2		4	17	15	7																				45	$ 1,793,600

Table 32 (Continued)

DEPT	COST CENTER	SHOP	O-8	O-5	O-4	O-3	O-2	O-1	W-4	W-3	W-2	E-9	E-8	E-7	E-6	E-5	E-4	E-3	GS-13	GS-12	GS-11	GS-9	GS-7	GS-6	GS-5	GS-4	GS-3	WD-6	WG-11	WG-10	WG-9	WG-7	WL-12	WL-10	WL-9	WN-7	TOTAL BILLETS	LABOR COST
	ORDNANCE ALTERATION	38Y											1	2	8	5																					16	$ 674,482
	FIRE CONTROL SHOP	67E											1	1	8	11																					21	$ 836,424
	SONAR REPAIR SHOP	67G												1	4	5																					10	$ 396,612
	INT COMBAT SYS CS-2								1																												1	$ 82,852
	ELECTRONICS REPAIR	67A										1		2	7	17	4																				31	$ 1,182,654
	ELECTRONICS CAL LAB	67B												1	2	5	6																				14	$ 487,152
	TELETYPE REPAIR SHOP	67D											1		3	7	3																				14	$ 520,360
	ANTENNA REPAIR SHOP	67H											1	1	6	8	8	6																				30	$ 1,028,412
	TEST EQUIPMENT REPAIR	67K												1	2	4	3																				10	$ 363,980
	LOAN POOL/MATERIAL	67Q												1	1	4	4																				10	$ 350,654
	SLQ-32 REPAIR	67W												1	4	10	2																				17	$ 631,598
	ADP REPAIR	67L												1	2	6	2																				11	$ 405,238
	MICRO MINIATURE REPAIR	67M												2	4	2	2																				10	$ 399,100
R-5	SERVICES DIVISION	R-35							1			1				1		1																			4	$ 210,627
	LIFE RAFT REPAIR	68C												1	1	6	6	5																			19	$ 603,711
	CORROSION CONTROL	71B											1	1	6	11	6	9																			34	$ 1,149,993
	OUTSIDE RIGGING	72A										1	1		5	9	9	3																			28	$ 994,211
	INSIDE RIGGING	72C											1		3	4	2	2																			12	$ 434,790
	WEIGHT TESTING SHOP	72D										1		5																							6	$ 316,546
	SAIL LOFT/UPHOLSTERY	74A												1	4	5	5	4																			19	$ 642,226
SUPPLY	SUPPLY ADMIN				1	1						1													1											4	$ 255,959
	INVENTORY QA TEAM													1	1	3	1																				6	$ 227,482
	STORAGE DIVISION												1	1			1																				3	$ 136,672
	TRAFFIC BRANCH													1	2	6	2																				11	$ 405,238
	STORAGE & ISSUE BRANCH													1	2	4	4																				11	$ 393,278
	MAT SCREEN/ID BRANCH														1	3	2																				6	$ 207,054
	STOCK CONTROL DIVISION																				1																1	$ 49,710
	SUDAPS STOCK MGT BR													1	3	4	2																				10	$ 377,306
	FISCAL MGT BRANCH															2					1	1	1		3												8	$ 276,184
	CUSTOMER SUPPORT DIV						1																														1	$ 57,323
	REQ ACCEPTANCE BRANCH													1	2	6	2																				11	$ 405,238
	STATUS/EXPEDITING BR												1		1	6																						8	$ 311,940
	MAT ACQUISITION BRANCH															1					1	1	2	5		3											13	$ 416,965
	CONTRACT ADMIN BRANCH															1						1		1	1	4											8	$ 230,540
	ADP DIVISION																		1	2																	3	$ 180,008
	IMACC SUPPORT BRANCH												1	1											1		1										4	$ 156,086
	MRMS BRANCH															1	2	1		2		1															7	$ 278,793
	TELECOM/LAN BRANCH															1	1			1		1	1														5	$ 198,719
	MICRO SUPPORT BRANCH													1			3					1															5	$ 178,598
	SUADPS BRANCH													1	1	3	4	3																			12	$ 389,719
TOTAL			1	2	4	10	1	2	3	7	0	26	44	194	408	642	354	120	3	11	28	11	5	7	9	8	1	3	1	1	1	1	1	8	1	3	1,921	$ 74,032,835

APPENDIX B. MRMS DEFINITIONS

This appendix provides definitions for the different manhour categories, production ratios and their associated formulas addressed in this study. These were compiled from instructions and training material used by SIMA San Diego.

A. MANHOURS

Total Manhours Assigned: This represents the total number of manhours available for support and production expenditures. Total Manhours Assigned includes 7.5 hours per day for every person assigned to SIMA San Diego as well as any support or production overtime hours expended. Personnel temporarily assigned to other duties or on leave are excluded from the Total Manhours Assigned for those periods. For FY 95 these hours totaled 3,882,791.

Gross Support Manhours (GS): Available manhours for support, prior to deductions, including overtime. Determined by the number of personnel assigned to support duties. For FY 95 there were 1,934,918 Gross Support Manhours.

Gross Production Manhours (GP): Available manhours for production, prior to deductions, including overtime. Determined by the number of personnel assigned to production duties. This includes overtime hours. There were 1,947,873 hours in this category in FY 95.

Productive Manhours Deductions: Deductions from Gross Production Manhours for non-productive hours. Included in this category are:

> Administrative: Hours spent on personnel administrative items (verification of personal data, pay discrepancies, etc.). This does not include administrative work which should be included in Support Manhours. FY 95 total: 44,468.
>
> Schools/Training: Documentation of personnel attending schools without Temporary Additional Duty Orders and training being conducted at SIMA. FY 95 total: 239,000.

Medical: Documentation of hours spent at either medical or dental appointments and sick call. FY 95 Total: 40,724.

Special Assignment: Hours spent by production personnel on items which are not direct production efforts. These include Preventive Maintenance, Corrective Maintenance, Tool Room Issue, Field Day and Physical Training as well as many others. FY 95 total: 224,366.

Leave: Personnel on leave are normally removed from being available for production and support efforts and therefore not included in the Total Hours Available. In cases where personnel on leave were not placed in an absence status the hours are deducted in the Leave category in order to remove their hours from the hours available for production. FY 95 total 10,398.

Special Liberty: Documentation of personnel granted early or special liberty from the work day. FY 95 total: 97,065.

Unauthorized Absence: Documentation of personnel who either reported for work late or did not report for work. FY 95 total: 661.

Other: Hours expended on efforts not covered by other deduction categories. FY 95 total: 25,963.

It should be noted there is a discrepancy between two different sources within the MRMS data base for the total Productive Manhours Deductions. The total of the categories listed above is 682,644 hours for FY 95. However, the total of the category of Productive Manhours Deductions in the monthly production reports (Report Number ETV275AR) for FY 95 is 799,231. This difference of 116,587 hours cannot be accounted for. The first number is the total of each deduction category for FY 95. The second number is the monthly total of deductions summed for FY 95 (the monthly summary report does not break the deduction hours into categories and only reports the total deductions for the month). For the purposes of this study the annual category totals were used with 682,644 deduction hours being considered the correct figure. This impacts both the Net Available Production Hours and the Unaccounted Time discussed below.

Net Available Production Manhours (AP): The total time available for work after deductions are made from Gross Production Manhours. For FY 95 these hours totaled 1,265,230.

Overtime Hours: Hours worked in addition to a full shift or day's work. FY 95 Production total: 53,127. FY 95 Support total: 11,510.

Earned Production Manhours (EP): The hours required to accomplish the steps listed in the Detailed Work Sheets (DWS). The DWS provides the steps required to perform the maintenance and the total amount of time required based on standard times for each step, any travel or preparation time required and a complexity factor. FY 95 total: 938,608. For the purposes of this report a total of 913,657 is used because the hours expended by the Quality Assurance shops (93A, 93B), the Tool Repair Shop (06B) and SIMA Det LB (99O) are not counted as direct labor hours.

Expended Production Hours (XP): The true time in manhours expended to complete the maintenance action. This category includes lost time and does not necessarily match Earned Production Hours. FY 95 total: 1,013,010. For the purposes of this report a total of 991,892 is used because the hours expended by the Quality Assurance shops (93A, 93B), the Tool Repair Shop (06B) and SIMA Det LB (99O) are not counted as direct labor hours.

Lost Time (LT): The productive time lost as a result of unplanned delays. Items included in this category include awaiting ship's force action, QA or transportation, obtaining parts or supplies, making special tools, and rework time. Lost Time is included in Expended Production Manhours. The total Lost Time for FY 95 was 118,598.

Unassigned to JCN (UJ): Manhours of personnel in shops with few or no jobs available. This is time which would be productive if work was available. There were 97,746 hours Unassigned to Jobs in FY 95.

Unaccounted Time (UT): By definition, the time which cannot be accounted for. SIMA San Diego uses the following formula to calculate Unaccounted Time:

$$UT = AP - (EP + UJ + LT)$$

This formula provides the following result for FY 95:

$$UT = 1{,}265{,}230 - (938{,}608 + 97{,}746 + 118{,}598)$$
$$= 110{,}278 \text{ hours}$$

This formula uses Earned Production Manhours which is the amount of time which should be used during FY 95. The researcher believes a more accurate determination for Unaccounted Time could be made by using Expended Production Manhours, which is the time actually used in FY 95 (including Lost Time). This formula

$$UT = AP - (XM + UJ)$$

provides the following Unaccounted Hours for FY 95:

$$UT = 1{,}265{,}230 - (1{,}013{,}010 + 97{,}746)$$
$$= 154{,}474 \text{ hours}$$

The number of hours used in this study for Unaccounted Time is 154,474.

B. PRODUCTION RATIOS

Performance Ratio (PR): Percentage showing how well the unit performed during that period; based on the amount of work steps completed (Earned Hours) compared to the hours available for work. This percentage will be low if there is a high amount of "Unassigned to JCN" hours.

$$PR = \frac{EM}{AP} \times 100$$

Workload Performance (WP): Percentage showing how well the units' personnel performed during the period, based on the amount of work planned compared to the manhours assigned to the unit.

$$WP = \frac{EM}{AP - UJ} \times 100$$

Utilization (U): A percentage showing how well the total productive manhours available were used in actual productive assignments. If there are a high number of deductions the utilization will be low.

$$U = \frac{AP}{GP} \times 100$$

Productivity (P): Percentage showing the unit's overall efficiency for the period based upon the work steps completed (Earned Manhours) compared to the Gross Production Available Manhours.

$$P = \frac{WP \times U}{100}$$

or

$$P = \left(\frac{EM}{AP - UJ} \times \frac{AP}{GP} \right) \times 100$$

Load Ratio (LR): Percentage showing the degree of loading in a shop based on comparing manhours assigned to work to the manhours available to do work.

$$LR = \frac{AP - UJ}{AP}$$

APPENDIX C. CALCULATION OF MANDAY RATES WITH DIRECT ALLOCATION OF SHOP SUPPORT

A. LABOR COSTS

This appendix presents the manday rates calculated, with the shop indirect labor costs being allocated directly to the shop and removed from the indirect cost overhead pool. All calculations in Table 33, which is continuous horizontally across two pages, are identical to those used in Table 25, with the only differences being that the labor cost includes all labor instead of only direct labor and the allocation rate for indirect overhead is smaller (because the shop indirect labor has been removed from the cost pool). This presents more accurate per shop manday rates and removes any possible bias caused by using the percentage of production personnel for determining the direct labor costs. It should be noted that the overall costs captured, $84,621,409, and the composite manday rate, $694.64, are identical to those previously presented in Table 25.

SHOP		DIRECT BILLETS	TOTAL DIRECT LABOR HOURS	DIRECT MANDAYS	DIRECT LABOR COST	G&A ALLOCATION	INDIRECT ALLOCATION
	ALLOCATION RATE					$ 5.171	$ 28.504
11A	SHIPFITTER SHOP	61	50,640.3	6752	$ 2,944,501	$ 261,884.25	$ 1,443,443.99
17A	SHEETMETAL SHOP	30	25,799.9	3440	$ 1,412,264	$ 133,423.13	$ 735,396.72
26A	WELDING SHOP	12	10,206.2	1361	$ 573,863	$ 52,780.95	$ 290,916.09
26Z	WELDING REQUAL SCHOOL	1	5,302.0	707	$ 77,902	$ 27,419.08	$ 151,127.46
31A	INSIDE MACHINE SHOP	63	45,968.2	6129	$ 3,044,496	$ 237,722.68	$ 1,310,271.11
31B	MECHANICAL ENGRAVING	4	2,722.9	363	$ 131,981	$ 14,081.37	$ 77,613.16
31D	VALVE REPAIR/TEST (1/2 38N)	51	42,079.9	5611	$ 2,407,202	$ 217,614.49	$ 1,199,439.55
31E	IC ENGINE SHOP (31C)	43	37,149.4	4953	$ 1,879,377	$ 192,116.61	$ 1,058,901.28
31F	HYDRAULIC REPAIR SHOP	11	5,574.0	743	$ 582,622	$ 28,825.71	$ 158,880.51
31G	PUMP REPAIR (1/2 38N)	54	42,565.8	5675	$ 2,849,022	$ 220,127.30	$ 1,213,289.58
31H	ALRE REPAIR	14	22,614.3	3015	$ 688,124	$ 116,948.93	$ 644,594.83
31T	GAS TURBINE REPAIRS	20	43,339.6	5779	$ 915,036	$ 224,128.98	$ 1,235,345.87
31Z	METAL BUILD UP SHOP	10	7,447.5	993	$ 441,882	$ 38,514.44	$ 212,282.49
35A	OPTICAL SHOP	6	6,902.6	920	$ 271,630	$ 35,696.52	$ 196,750.74
35D	WATCH/CLOCK REPAIR	0	0.0	0	$ 77,902	$ -	$ -
35E	TYPEWRITER REPAIR	0	1.9	0	$ 64,576	$ 9.83	$ 54.16
37A	PRINT SHOP	6	11,393.1	1519	$ 306,342	$ 58,918.95	$ 324,747.32
38A	AUXILIARY SHOP	35	29,810.4	3975	$ 1,610,612	$ 154,163.27	$ 849,711.45
38B	ORDNANCE REPAIR	38	29,408.2	3921	$ 1,793,600	$ 152,083.31	$ 838,247.20
38Y	ORDNANCE ALTERATION	13	8,754.6	1167	$ 674,482	$ 45,274.06	$ 249,539.89
38Z	AIR COMPRESSOR/ALIGNMENT SHOP	11	14,610.5	1948	$ 515,267	$ 75,557.61	$ 416,455.64
41A	BOILER REPAIR SHOP	46	40,695.8	5426	$ 2,181,105	$ 210,456.68	$ 1,159,987.36
41B	BOILER OUTSIDE REPAIR	14	5,049.4	673	$ 686,182	$ 26,112.77	$ 143,927.39
51A	INSIDE ELECTRICAL	47	18,665.4	2489	$ 2,264,621	$ 96,527.36	$ 532,035.94
51B	OUTSIDE ELECTRICAL	36	22,831.8	3044	$ 1,825,008	$ 118,073.73	$ 650,794.42
51G	GYRO/C REPAIR	34	15,448.0	2060	$ 1,650,992	$ 79,888.70	$ 440,327.62
51H	CABLE INSPECTION	8	11,394.6	1519	$ 344,857	$ 58,926.71	$ 324,790.08
56A	PIPEFITTING SHOP	37	17,008.4	2268	$ 1,858,216	$ 87,958.25	$ 484,805.04
56B	AC&R SHOP	29	11,064.5	1475	$ 1,275,930	$ 57,219.61	$ 315,380.95
56C	FLEXIBLE HOSE SHOP	13	12,454.0	1661	$ 531,467	$ 64,405.35	$ 354,987.07
57A	LAGGING SHOP	41	34,865.3	4649	$ 1,651,698	$ 180,304.48	$ 993,795.61
64A	PATTERN SHOP	8	7,913.7	1055	$ 399,258	$ 40,925.38	$ 225,570.99
64E	KEY & LOCK SHOP	2	6,074.0	810	$ 85,248	$ 31,411.44	$ 173,132.44
67A	ELECTRONICS REPAIR	25	15,260.7	2035	$ 1,182,654	$ 78,920.09	$ 434,988.85
67B	ELECTRONICS CAL LAB	12	15,391.8	2052	$ 487,152	$ 79,598.07	$ 438,725.70
67D	TELETYPE REPAIR SHOP	14	423.5	56	$ 520,360	$ 2,190.11	$ 12,071.38
67E	FIRE CONTROL SHOP	18	17,993.4	2399	$ 836,424	$ 93,052.14	$ 512,881.34
67G	SONAR REPAIR SHOP	8	1,557.2	208	$ 396,612	$ 8,053.00	$ 44,386.21
67H	ANTENNA REPAIR SHOP	23	13,904.4	1854	$ 1,028,412	$ 71,906.04	$ 396,329.06
67K	TEST EQUIPMENT REPAIR	8	11,214.5	1495	$ 363,980	$ 57,995.33	$ 319,656.53
67L	ADP REPAIR (84C) (67X) (67T)	9	13,397.7	1786	$ 405,238	$ 69,285.66	$ 381,886.16
67M	MICRO MINIATURE REPAIR (84D)	8	3,444.2	459	$ 399,100	$ 17,811.54	$ 98,172.99
67W	SLQ-32 REPAIR	14	8,490.2	1132	$ 631,598	$ 43,906.72	$ 242,003.47
68C	LIFE RAFT REPAIR	14	11,449.6	1527	$ 603,711	$ 59,211.14	$ 326,357.79
71B	CORROSION CONTROL	26	29,404.3	3921	$ 1,149,993	$ 152,063.14	$ 838,136.03
72A	OUTSIDE RIGGING	21	22,714.0	3029	$ 994,211	$ 117,464.53	$ 647,436.66
72C	INSIDE RIGGING	8	7,207.6	961	$ 434,790	$ 37,273.81	$ 205,444.42
72D	WEIGHT TESTING SHOP	4	7,462.0	995	$ 316,546	$ 38,589.43	$ 212,695.80
74A	SAIL LOFT/UPHOLSTERY (74Z)	13	25,034.2	3338	$ 642,226	$ 129,463.35	$ 713,571.32
81A	FOUNDRY SHOP	10	16,472.7	2196	$ 431,385	$ 85,187.90	$ 469,535.53
92A	SOUND ANALYSIS	6	5,117.3	682	$ 305,384	$ 26,463.91	$ 145,862.80
95B	TEST/SPECTRO LAB	1	6,110.9	815	$ 83,602	$ 31,602.27	$ 174,184.23
96A	MIRCS LAB	13	14,278.4	1904	$ 610,604	$ 73,840.17	$ 406,989.51
96B	OUTSIDE CALIBRATION	24	21,572.0	2876	$ 967,978	$ 111,558.72	$ 614,885.26
	TOTAL	1076	913,656.8	121821	$ 50,809,225.00	$ 4,724,944.17	$ 26,042,773.50

Table 33. Manday Rates Calculated with Shop Support Allocated Directly to Shop

SHOP	EQUIPMENT DEPRECIATION	SUB-TOTAL	MANDAY RATE	SECURITY	FIRE PROTECTION	PERSONNEL SUPPORT	TOTAL	MANDAY RATE
ALLOCATION RATE	$ 0.608			$ 1.056	$ 0.261	$ 1.408		
11A	$ 30,782.75	$ 4,680,612	$ 693.21	$ 53,464	$ 13,202	$ 71,295	$ 4,818,574	$ 713.65
17A	$ 15,683.00	$ 2,296,767	$ 667.67	$ 27,239	$ 6,726	$ 36,323	$ 2,367,055	$ 688.10
26A	$ 6,204.05	$ 923,764	$ 678.83	$ 10,775	$ 2,661	$ 14,369	$ 951,569	$ 699.26
26Z	$ 3,222.93	$ 259,671	$ 367.32	$ 5,598	$ 1,382	$ 7,465	$ 274,116	$ 387.75
31A	$ 27,942.72	$ 4,620,433	$ 753.85	$ 48,532	$ 11,984	$ 64,717	$ 4,745,666	$ 774.29
31B	$ 1,655.17	$ 225,331	$ 620.65	$ 2,875	$ 710	$ 3,833	$ 232,749	$ 641.09
31D	$ 25,579.14	$ 3,849,835	$ 686.17	$ 44,426	$ 10,971	$ 59,243	$ 3,964,475	$ 706.60
31E	$ 22,582.03	$ 3,152,977	$ 636.55	$ 39,221	$ 9,685	$ 52,302	$ 3,254,185	$ 656.98
31F	$ 3,388.27	$ 773,716	$ 1,041.06	$ 5,885	$ 1,453	$ 7,847	$ 788,902	$ 1,061.49
31G	$ 25,874.50	$ 4,308,313	$ 759.12	$ 44,939	$ 11,097	$ 59,927	$ 4,424,277	$ 779.55
31H	$ 13,746.57	$ 1,463,414	$ 485.34	$ 23,875	$ 5,896	$ 31,838	$ 1,525,023	$ 505.77
31T	$ 26,344.87	$ 2,400,856	$ 415.47	$ 45,756	$ 11,299	$ 61,017	$ 2,518,928	$ 435.91
31Z	$ 4,527.12	$ 697,206	$ 702.12	$ 7,863	$ 1,942	$ 10,485	$ 717,496	$ 722.55
35A	$ 4,195.89	$ 508,273	$ 552.26	$ 7,288	$ 1,800	$ 9,718	$ 527,078	$ 572.70
35D	$ -	$ 77,902	$ -	$ -	$ -	$ -	$ 77,902	$ -
35E	$ 1.15	$ 64,641	$ 255,162.39	$ 2	$ 0	$ 3	$ 64,646	$ 255,182.82
37A	$ 6,925.53	$ 696,934	$ 458.79	$ 12,028	$ 2,970	$ 16,040	$ 727,973	$ 479.22
38A	$ 18,120.87	$ 2,632,608	$ 662.34	$ 31,473	$ 7,772	$ 41,969	$ 2,713,821	$ 682.77
38B	$ 17,876.38	$ 2,801,807	$ 714.55	$ 31,048	$ 7,667	$ 41,403	$ 2,881,925	$ 734.98
38Y	$ 5,321.66	$ 974,618	$ 834.95	$ 9,243	$ 2,282	$ 12,325	$ 998,468	$ 855.38
38Z	$ 8,881.29	$ 1,016,162	$ 521.63	$ 15,425	$ 3,809	$ 20,570	$ 1,055,966	$ 542.06
41A	$ 24,737.78	$ 3,576,287	$ 659.09	$ 42,965	$ 10,610	$ 57,294	$ 3,687,156	$ 679.52
41B	$ 3,069.38	$ 859,292	$ 1,276.33	$ 5,331	$ 1,316	$ 7,109	$ 873,048	$ 1,296.76
51A	$ 11,346.15	$ 2,904,530	$ 1,167.08	$ 19,706	$ 4,866	$ 26,278	$ 2,955,381	$ 1,187.51
51B	$ 13,878.78	$ 2,607,755	$ 856.62	$ 24,105	$ 5,952	$ 32,144	$ 2,669,957	$ 877.05
51G	$ 9,390.39	$ 2,180,599	$ 1,058.68	$ 16,309	$ 4,027	$ 21,749	$ 2,222,684	$ 1,079.11
51H	$ 6,926.44	$ 735,500	$ 484.11	$ 12,030	$ 2,971	$ 16,042	$ 766,543	$ 504.54
56A	$ 10,338.91	$ 2,441,318	$ 1,076.52	$ 17,957	$ 4,434	$ 23,946	$ 2,487,655	$ 1,096.95
56B	$ 6,725.79	$ 1,655,256	$ 1,122.00	$ 11,682	$ 2,885	$ 15,577	$ 1,685,400	$ 1,142.44
56C	$ 7,570.42	$ 958,430	$ 577.18	$ 13,148	$ 3,247	$ 17,534	$ 992,359	$ 597.61
57A	$ 21,193.59	$ 2,846,992	$ 612.43	$ 36,810	$ 9,090	$ 49,086	$ 2,941,977	$ 632.86
64A	$ 4,810.51	$ 670,565	$ 635.51	$ 8,355	$ 2,063	$ 11,141	$ 692,125	$ 655.94
64E	$ 3,692.21	$ 293,484	$ 362.39	$ 6,413	$ 1,584	$ 8,551	$ 310,032	$ 382.82
67A	$ 9,276.53	$ 1,705,839	$ 838.35	$ 16,112	$ 3,979	$ 21,485	$ 1,747,415	$ 858.78
67B	$ 9,356.22	$ 1,014,832	$ 494.50	$ 16,250	$ 4,013	$ 21,670	$ 1,056,765	$ 514.93
67D	$ 257.43	$ 534,879	$ 9,472.47	$ 447	$ 110	$ 596	$ 536,033	$ 9,492.90
67E	$ 10,937.66	$ 1,453,295	$ 605.76	$ 18,997	$ 4,691	$ 25,332	$ 1,502,315	$ 626.19
67G	$ 946.58	$ 449,998	$ 2,167.34	$ 1,644	$ 406	$ 2,192	$ 454,240	$ 2,187.77
67H	$ 8,452.08	$ 1,505,099	$ 811.85	$ 14,680	$ 3,625	$ 19,576	$ 1,542,980	$ 832.28
67K	$ 6,816.97	$ 748,449	$ 500.55	$ 11,840	$ 2,924	$ 15,789	$ 779,001	$ 520.98
67L	$ 8,144.07	$ 864,554	$ 483.98	$ 14,145	$ 3,493	$ 18,862	$ 901,054	$ 504.41
67M	$ 2,093.63	$ 517,178	$ 1,126.19	$ 3,636	$ 898	$ 4,849	$ 526,561	$ 1,146.63
67W	$ 5,160.94	$ 922,669	$ 815.06	$ 8,964	$ 2,213	$ 11,953	$ 945,799	$ 835.49
68C	$ 6,959.88	$ 996,240	$ 652.58	$ 12,088	$ 2,985	$ 16,120	$ 1,027,432	$ 673.01
71B	$ 17,874.01	$ 2,158,066	$ 550.45	$ 31,044	$ 7,666	$ 41,397	$ 2,238,174	$ 570.88
72A	$ 13,807.18	$ 1,772,919	$ 585.41	$ 23,981	$ 5,922	$ 31,978	$ 1,834,800	$ 605.84
72C	$ 4,381.29	$ 681,890	$ 709.55	$ 7,610	$ 1,879	$ 10,147	$ 701,525	$ 729.99
72D	$ 4,535.93	$ 572,367	$ 575.28	$ 7,878	$ 1,945	$ 10,506	$ 592,696	$ 595.71
74A	$ 15,217.56	$ 1,500,478	$ 449.53	$ 26,430	$ 6,527	$ 35,245	$ 1,568,680	$ 469.96
81A	$ 10,013.27	$ 996,122	$ 453.53	$ 17,391	$ 4,295	$ 23,191	$ 1,040,999	$ 473.97
92A	$ 3,110.66	$ 480,821	$ 704.70	$ 5,403	$ 1,334	$ 7,204	$ 494,763	$ 725.13
95B	$ 3,714.64	$ 293,103	$ 359.73	$ 6,452	$ 1,593	$ 8,603	$ 309,751	$ 380.16
96A	$ 8,679.42	$ 1,100,113	$ 577.86	$ 15,075	$ 3,722	$ 20,102	$ 1,139,012	$ 598.29
96B	$ 13,112.99	$ 1,707,535	$ 593.66	$ 22,775	$ 5,624	$ 30,371	$ 1,766,305	$ 614.10
	$ 555,385.81	$ 82,132,294	$ 674.21	$ 964,608	$ 238,197	$ 1,286,312	$ 84,621,409	$ 694.64

Table 33 (Continued)

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